

BIENNIAL REPORT
OF THE
Department of Fisheries
OF THE
STATE OF OREGON
TO THE
TWENTY-SEVENTH
LEGISLATIVE ASSEMBLY
REGULAR SESSION

1913

Master Fish Warden
R. E. CLANTON



SALEM, OREGON
WILLIS S. DUNIWAY, STATE PRINTER
1913

BIENNIAL REPORT

OF THE

Department of Fisheries

OF THE

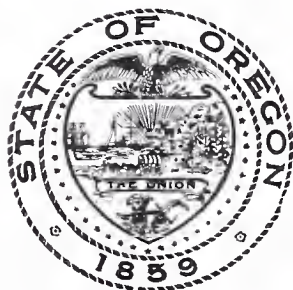
STATE OF OREGON

TO THE

TWENTY-SEVENTH
LEGISLATIVE ASSEMBLY
REGULAR SESSION

1913

Master Fish Warden
R. E. CLANTON



SALEM, OREGON

WILLIS S. DUNIWAY, STATE PRINTER

1913

OFFICE OF
STATE BOARD OF FISH AND GAME COMMISSIONERS.

Portland, Oregon, December 31, 1912.

To the Honorable the Senate and the House of Representatives of
the Legislative Assembly of the State of Oregon:

GENTLEMEN: As the State Board of Fish and Game Commissioners of the State of Oregon, we have the honor to submit herewith for your consideration the reports of the Master Fish Warden, R. E. Clanton, for the years 1911 and 1912, which contain a full account of his actions as carried on under our instructions and supervision, as well as of the operations and results of the laws pertaining to the fish and shell fish industries, the methods of taking fish, the number of fish hatched and where distributed. The reports also show in detail all receipts and disbursements connected with the operation of the hatcheries, police patrol work, etc. In addition thereto, it gives in detail many other matters of importance and interest connected with these industries as well as suggestions for your consideration, which we submit for your careful attention.

For the details of the items of disbursements of the appropriations and the hatchery funds for expenses incurred by the department during the past two years, you are referred to the exhibit contained in the report of the office of the Secretary of State.

Close supervision over administrative and detail work in connection with the hatchery operations and the enforcement of the laws regulating these industries, has been within the province of the Board at all times, and we, as a body, have devoted considerable time and attention studying the different phases of the work with a view of familiarizing ourselves with the needs of the industries.

Respectfully submitted,

C. K. CRANSTON, Chairman.

J. F. HUGHES, Secretary.

C. F. STONE.

M. J. KINNEY.

G. H. KELLY.

LETTER OF TRANSMITTAL.

Portland, Oregon, December 31, 1911 .

To the Honorable State Board of Fish and Game Commissioners of
the State of Oregon:

GENTLEMEN: Complying with the provisions of the law, I hereby
submit, for your consideration, the Annual Report of the Department
of Fisheries for the year 1911.

Respectfully,

R. E. CLANTON,
Master Fish Warden.



Digitized by the Internet Archive
in 2014

REPORT

GENERAL.

The year 1911 was one of vast encouragement for those vitally interested in the development of one of Oregon's greatest and most valuable assets—its salmon industry. With an output well up among its banner years and with unprecedented prices paid for the finished product, from a financial point of view, the season just closed is the greatest on record. When it is taken into consideration that the salmon product of 1911 reached the enormous value of \$6,000,000, and to gather and care for this immense harvest, 8,000 of Oregon's laboring people were actually employed and more than 40,000 people depended upon it for support, some idea of the great magnitude of the salmon industry may be realized; and what's more, with the knowledge gained of the habits of the fish in their migrations to and from their native streams, by careful observations and scientific investigation, it is not beyond probability to build the fishing industry to more than double its present proportions through artificial propagation. While the results of the fishing operations of 1909 and 1910 led us to believe that the production of salmon was again on an upward trend, this season's output not only showed a marked increase over the two previous years, but surpassed all seasons for the past fifteen years.

Another convincing and satisfactory feature in favor of the importance of the salmon industry to the state over other industries is the fact that, while the greater portion of the products of the latter are consumed within the borders of the state, fully nine-tenths of the delicious and highly nutritious food products of the salmon industry goes forth to all of the principal markets of the world, bringing in return many millions of dollars that find their way into every commercial enterprise of the state and contributes largely to the support of thousands of families within the state.

Although the large take of salmon during the year 1911 is evidence of the fact that the number of salmon entering the Columbia River is on the increase, we must not lose sight of the fact that the annual run was not as great as before extensive fishing begun. For the purpose of comparison the season of 1876 may be cited, when, with probably not more than one-eighth of the gear now in use, a pack of 450,000 cases was put up—one of the pioneer canneries having packed 45,000 cases. This cannery only employed thirty boats and often it was necessary to limit the day's catch owing to the inability of the cannery to care for the fish. Only

gill nets were used and no fishing was carried on above Rainier. Nothing but chinooks was kept, all other varieties being thrown back into the water. Then again, the open season at that time ended August 1st, and, as a result, the larger portion of the fish entering the river was allowed to escape to the upper reaches of the streams. Today, with a much longer open season, many miles of nets comb the waters and hundreds of traps and fishwheels stationed at every point of vantage along the streams, the number of salmon that escape all of these pitfalls and eventually reach the spawning grounds is comparatively small.

To sum up the importance of the salmon fishing industry it may be remarked that the Columbia River, from its mouth to the Cascade Locks, covers an area of about 89,000 acres. The Columbia River is the greatest fishing stream in the world and no other stream yields such an immense revenue from the fishing industry. From this area salmon to the approximate value of \$100,000,000 has been taken from this stream during the past forty-five years and every acre of this vast expanse of water has produced \$25.00 annually of the best food fish in the world. No like area within the state can in any way compare in production and no other crop produced yields so large a return with so little effort.

Although the Columbia River is our greatest salmon producing stream, Oregon's coast rivers must not be overlooked when considering the extent of the industry. At least \$1,000,000 of the total value of the 1911 product went to the fishermen and packers on these smaller streams, and commercial fishing along the coast was not begun for several years after it began on the Columbia. The money realized from the salmon taken from these streams has played no small part in the development of the coast counties.

Many of the substantial citizens of the coast today, who own the best improved farms in those parts of the state went there for the purpose of fishing for the canneries located on the bays at the mouths of the streams. Even at this date numbers of the smaller farmers located on streams and remote from the markets depend almost entirely on the fishing industry. These people fish during the three or four months of the season and spend the balance of the year in clearing up and improving their farms.

The increase in the number of fish that have entered our streams during the past three years can be accounted for in no other way than that it is directly due to the effect of artificial propagation. Pursuing this work on a broader and more scientific basis there is no reason why our fisheries should be depleted. On the contrary, the results attained during the past three years prove conclusively that they can be gradually built up until the catch becomes as great as it was before the extensive fishing began. The area of the feeding grounds in the ocean is just as great now as it was a hundred years ago and the food supply there is also equally as plentiful. Then, by increasing our hatchery operations until the output of fry is

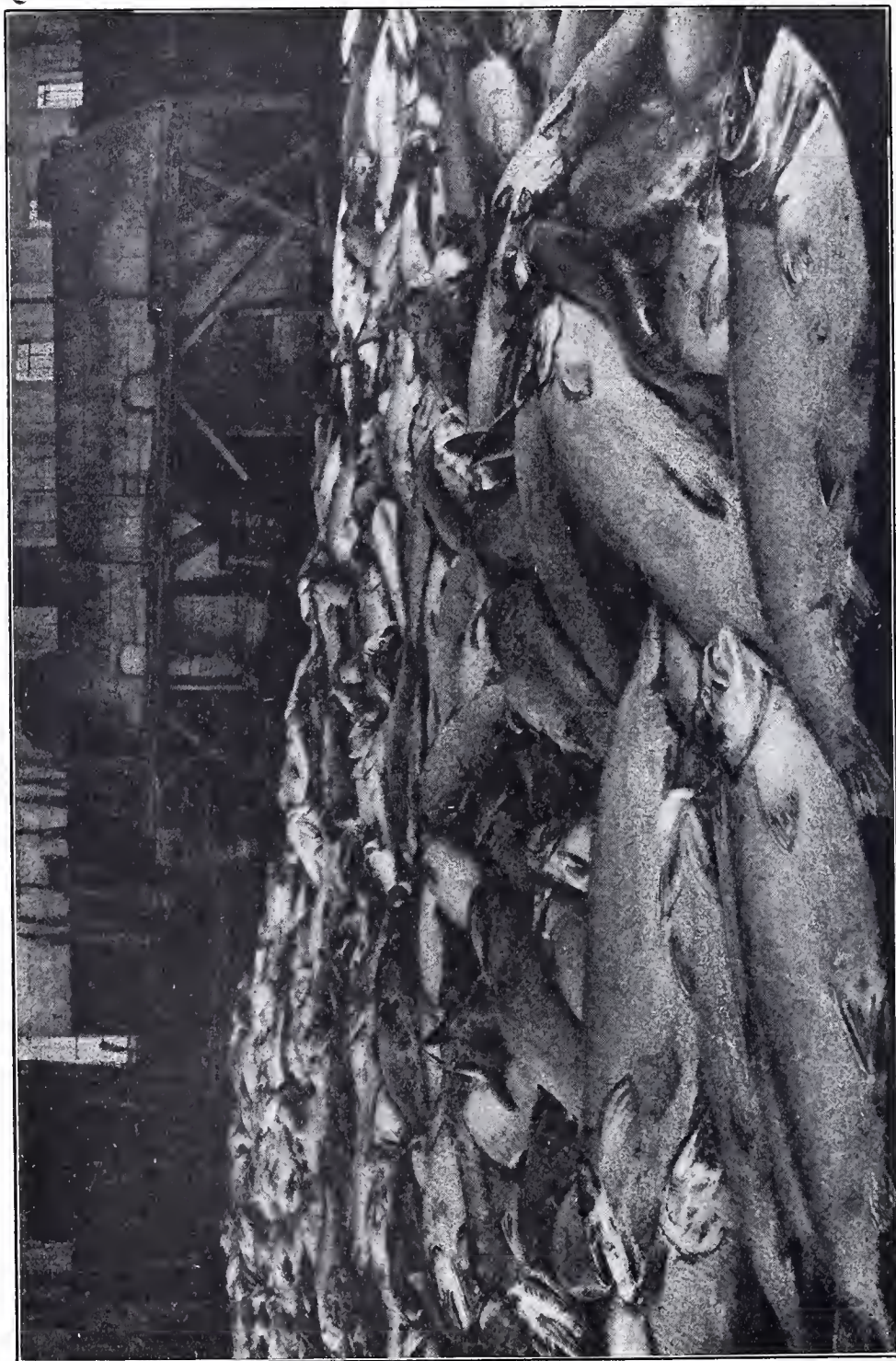
sufficient to restock this vast pasture, it would only be a matter of a few years until we have the salmon running in as great, or greater numbers than ever before.

Realizing the vast amount of wealth which our salmon fisheries have contributed to the state and the large number of people that is depending thereon, it would be a short-sighted policy for the state not to build up the industry and perpetuate it to the highest possible degree.

During the past year, according to reports filed with this office by the canners, packers, dealers and others engaged in the handling of salmon and sturgeon in the state of Oregon and on the Columbia River, the following table shows the amount of the entire product, in pounds:

Specie.	Columbia River.		Coast Streams.	Totals.
	Oregon.	Washington.		
Chinook.....	21,937,174	9,082,465	3,096,286	34,115,925
Blueback.....	457,681	38,535	.....	496,216
Steelhead.....	1,611,721	608,600	46,067	2,266,388
Silverside.....	913,558	2,681,770	7,130,832	10,726,160
Chum.....	160,737	1,449,110	595,240	2,205,087
Sturgeon.....	195,178	75,000	1,774	271,952
Totals.....	25,276,049	13,935,480	10,870,199	50,081,728

Owing to the large amount of salmon and other food fish consumed by private individuals of which the department is unable to gather statistics, the foregoing figures herein set forth merely show the product handled in a commercial manner.



Salmon on the Floor of a Packing Establishment.

DISTRICT No. " 1."**TABLE.**

Showing the Chinook, Silverside, Steelhead and Blueback product of the Oregon side of the Columbia River, from 1901 to 1911, both inclusive.

Year.	Chinooks, Number of Pounds.	Silversides, Number of Pounds.	Steelheads, Number of Pounds.	Bluebacks, Number of Pounds.	Total Number of Pounds.
1901.....	13,381,318	1,284,526	1,792,033	267,558	16,725,435
1902.....	16,528,217	996,047	2,761,761	889,243	21,175,868
1903.....	20,601,939	1,007,444	2,666,375	299,470	24,575,228
1904.....	19,614,174	1,558,375	1,772,075	521,699	23,466,323
1905.....	20,768,977	478,119	2,797,218	380,977	24,425,291
1906.....	19,010,120	1,722,180	1,553,400	623,000	22,908,700
1907.....	15,798,116	1,045,516	1,112,009	196,102	18,151,743
1908.....	14,447,797	1,033,185	2,588,773	393,791	18,463,546
1909.....	12,473,731	1,426,677	2,153,155	1,551,434	17,604,997
1910.....	12,624,224	1,677,682	2,240,977	777,968	17,320,851
1911.....	21,937,174	913,558	1,611,721	457,681	24,920,134

From the above it will be seen that the Chinook pack this year exceeded last year's pack by 9,312,950 pounds, while the Silverside pack was 764,124 pounds less, the Steelhead pack 629,256 pounds and the Blueback pack 320,287 pounds.

As noted, the foregoing table merely shows the salmon product handled by the different canners, packers and dealers on the Oregon side of the Columbia River and its tributaries, but through the courtesy of the canners and packers on the Washington side of the Columbia River, I have also been able to gather statistics showing the entire pack of the Columbia River and its tributaries during the past year, as will be seen by the following:

TABLE.

Showing the entire product of the Columbia River (Oregon and Washington) in pounds for the year 1911:

Specie of Fish.	Oregon.	Washington.	Total.
Chinook Salmon.....	21,937,174	9,082,465	31,019,639
Blueback Salmon.....	457,681	38,535	496,216
Steelhead Salmon.....	1,611,721	608,600	2,220,321
Silverside Salmon.....	913,558	2,681,770	3,595,328
Chum Salmon.....	160,737	1,449,110	1,609,847
Sturgeon.....	195,178	75,000	270,178
Totals.....	25,276,049	13,935,480	39,211,529

LAW ENFORCEMENT.**COLUMBIA RIVER.**

The Spring Closed Season Period on the Columbia River, which extends from 12 o'clock, noon, on March 1st, to 12 o'clock, noon, on May 1st, was exceptionally well observed considering the patrol service available for the large area of water which it was necessary

to cover. Heretofore the large amount of salmon turned over to the canners and cold storage plants on the opening day of the fishing season by some of the fishermen was a mystery, and feeling satisfied that caches were being made at different points on the Columbia River, after a thorough search having been kept up for several weeks, being determined to put a stop to such practice, three and one-half tons of salmon were found stored away, all carefully iced, in a remote place in the vicinity of Cascade Locks. An extra effort was made to apprehend the owners thereof, but of no avail, and, as a last resort, the salmon were taken to Portland, where 2,400 pounds were stored with the Portland Fish Company until after the opening of the fishing season, and the balance of the fish were distributed amongst the various charitable institutions in Portland, as well as the State Institutions in and around Salem. Other caches were also found fully equipped with ice but had never been utilized, although it was no doubt the intention of the owners to make use of them before the season opened had the caches not been found and their operations interfered with.

The twenty-four hour weekly closed season periods on the Columbia River, extending from 6 o'clock P. M. on Saturday to 6 o'clock P. M. on the following Sunday of each week from May 1st to August 25th, were also well observed, as was the fall closed season period, extending from 12 o'clock, noon, on August 25th until 12 o'clock, noon, on September 10th. It is true that an occasional fisherman would take chances on going out during these closed seasons now and then, but this practice was not carried on to any extent and the greater portion of the fishermen attempting to encroach upon the laws in this manner were detected and taken into court.

TRIBUTARIES TO THE COLUMBIA RIVER.

At the conference held between the Joint Committees on Salmon Fisheries appointed by the presiding officers of the Legislatures of Oregon and Washington, held at the Imperial Hotel, Portland, on January 25, 1911, after due deliberations, it was agreed that the Committee from each State was to recommend to their respective Legislatures that the concurrent laws now in force on the main Columbia should remain as they were, but that the tributaries of the Columbia River in the State of Oregon, west of the confluence with the Deschutes River, should be provided with a spring closed season to conform with that on the main Columbia. This additional thirty days closed season on the Willamette River was bitterly opposed by the Clackamas County delegation, who succeeded in preventing the enactment of such a law, and, as a result, salmon fishing was allowed on the Willamette River up until March 15th, noon, while on the Columbia the season closed at 12 o'clock, noon,

on March 1st. At the meeting of the Board of Fish Commissioners on March 8th, their attention was called to the fact that the closed season on the Willamette River would expire on April 15th, noon, while no fishing would be allowed on the Columbia until May 1st, noon, and desiring to give the salmon all the protection within its power so as to allow as many salmon as possible to reach the hatcheries on the headwaters of the Willamette and Clackamas, the Board decided to exercise the prerogative power vested in it under Section 5316 of Lord's Oregon Laws, and passed an order closing the Willamette River and its tributaries to fishing for salmon, other than with hook and line, from April 15th, noon, to May 1st, noon, and instructed me to have the necessary notices published, posted and filed, which was done. After the expiration of the spring closed season provided for under Section 5237 of the above code, some of the fishermen affected threatened to contest the Board's action in providing the additional closed season, but upon securing legal advice, in face of the decision handed down by the Supreme Court of the State of Oregon during 1910, notwithstanding a Circuit Judge's later ruling to the contrary, nothing materialized. As a precaution, however, an additional corps of deputies was sworn in prior to the order of the Board taking effect so that the department would be in a position to cope with conditions as they might arise.

In conclusion, will add that the number of arrests made on the Columbia River and its tributaries during the year 1911 for violations of the laws pertaining to the fishing industry was seventeen, which netted the department \$654.96 in fines, while the sale of confiscated salmon found held illegally amounted to \$356.69, and the sale of confiscated gear amounted to \$225.00, making a total of \$1,236.65.

BOTH DISTRICTS.

FEEDING FRY IN RETAINING PONDS.

Although the subject of retaining and feeding the young salmon fry at the hatcheries until they were of sufficient age and size to protect themselves against their predatory enemies before being turned out to shift for themselves, was taken up and strongly advocated by a large number of leading cannery and packers on the Columbia River several years ago, no definite steps were taken to put the policy into systematic practice until the year 1910. As early as 1904 the matter was taken up for consideration by those most vitally interested in the perpetuation of the salmon industry on the Columbia River and the adoption of a system of retaining and feeding the fry was urgently demanded. It was pointed out that, although the young salmon were being turned out by the

Federal Government and State hatcheries by increasing millions each succeeding year, and that immense sums of money were being expended in the propagation of the fish, there was no perceptible increase in the supply and this was an indication that the fry were turned out at such a tender age that most of them fell an easy prey to their enemies and were devoured before they could reach the ocean. While fish have been held (for short periods only) at some of the State hatcheries in years past, it has only been upon a very limited scale—the number of fish held and fed being very small in proportion to the number hatched—and it was only followed out spasmodically and without system governed by the crude nature of equipment at hand and the food supply available. My predecessors in office have expressed themselves as favorable to the adoption of the policy upon a general scale but no definite steps were taken to put it into systematic practice until two years ago. In 1910, upon assuming charge of the office of Master Fish Warden, I conferred with my immediate predecessor, Mr. H. C. McAllister, who was an ardent advocator of holding and feeding the fry but had been prevented from carrying it out to a successful issue on account of no funds being available for the purpose of establishing the ponds at the time. In order to overcome the financial deficiency and to raise the necessary funds which would permit me to put the plans into immediate practice, as set forth in my previous report, I took the matter up with the cannerymen and packers along the Columbia River, some of whom contributed a sum aggregating \$1,500.00. With this money three large tanks or ponds, each 100 feet long by 20 feet wide and three feet deep, were constructed at the Bonneville Central Hatchery Station. These ponds were so constructed that they could be easily cleaned and made sanitary with a small amount of labor. Upon the completion of these ponds a substantial start was made toward the establishment of a practical system of retaining ponds at this station whereby more sensible and beneficial propagation work could be carried on. Our funds were exhausted but we found that a number of ponds could be provided by a series of dams across an old creek channel, located near the hatchery, and that this work could be done by the hatchery crew at spare times and at nominal expense to the State. This we proceeded to do and an abundant supply of water was obtained by the clearing away of some debris and the opening up of the old channel for a short distance where it intersected with the main stream. It subsequently developed, when the ponds were put into operation, that they afforded ideal conditions for the fish, having an adequate supply of water which, tumbling from one pond into another, supplies sufficient aeration to prevent them from becoming sluggish and unsanitary. These ponds, in conjunction with those first constructed, enabled us to properly care for the larger portion of the output of the hatchery during the past year. Your Commission, having assumed supervision over this department, and, after a



Pond Constructed by Using a Portion of the River Bed.

thorough investigation, having approved the policy of retaining and feeding the fry, outlined broader plans looking to the establishment of a complete system of ponds, not only at the Bonneville station, but at all of the state hatcheries, so that ultimately all of the fry hatched can be properly cared for until they have attained a size sufficient to care for themselves. In accordance with your instructions and in conformity with your plans, work was begun at the Central Station on the first unit of ponds, east of the hatchery building, seven of which have been brought to completion. Four additional large ponds have also been made under the hill, the water supply for which is to be taken from the new flume. This gives us an aggregate of fifteen large ponds at the Central Station in which the larger part of the fry at this plant can be cared for during the coming summer.

At the other State plants, where hatching operations are being carried on, plans were outlined and work begun upon a system of artificial ponds near the stations, some of which have been completed. It also developed, upon investigation, that at all of the hatcheries where propagation work is being done, by placing dams at intervals in the streams nearby, a series of natural nursery ponds could be formed. Instructions were issued to the superintendents of the different hatcheries accordingly, resulting in a number of these ponds being established at each station into which the fry can be transferred from the troughs. While the system is far from complete as yet, a substantial beginning has been made and, if as good progress is made in the future as has been realized the past year, it is only a matter of a short time until all of the fry hatched can be properly cared for.

FOOD FOR YOUNG FRY

One of the most difficult problems with which we have had to contend, since the adoption of the policy of the Board of detaining the young fry until they reach the age and size sufficient for self protection against their predatory enemies before liberating them, has been the matter of providing an adequate supply of nutritious food at the least possible cost. In former years, it had been the practice of feeding ground liver to the young fish, which was practicable when the lesser number of fish to be fed was taken into consideration, but when the number of fry ran into the millions, this article of food became prohibitive from a financial standpoint and it became necessary to seek and discover, if possible, some other character of food equal in nutritive value but less expensive to meet the needs of the rapidly increasing number of young fish cared for each succeeding year.

On the coast streams, the superintendents in charge of the hatcheries had been experimenting with salt and dried salmon

(taken after the spawning season) mixed with a mush of wheat product. My predecessor, Mr. H. C. McAllister, procured a supply of cold storage smelt, which had been carried over, as an experiment, and this proved satisfactory. Realizing that smelt was a good food for the young fry and the cost of same within the limit of our zone of expenditures for this necessity, I arranged with the Warren Packing Company to secure from the fishermen on the the Cowlitz River ten and one-half tons of smelt, at the average of the very low figure of \$8.75 per ton, which supply was principally used at the Bonneville Central Hatchery as needed—an occasional shipment being forwarded to and consumed at the other stations on the tributaries of the Columbia and the hatcheries on the coast streams. During the early summer season, however, the supply of smelt having been exhausted, I found it necessary to seek other provender for the rapidly developing and ravishingly hungry baby fish

FOOD VALUE OF LAMPER EEL DISCOVERED.

Having had knowledge of the apparently inexhaustible supply of lamper eel in the Columbia and Willamette rivers, and knowing that this specie of fish is not considered of nutritious or commercial value as a table food, I determined upon an experiment as to their value as a sustenance to the offspring of the more valuable food fishes. Following out this line of reasoning, I made arrangements with the superintendent of the Bonneville Central Hatchery to secure a small amount of the lamper eel as our experiment, which was accomplished, and, as a result, it was proven they were an excellent and much relished food for the young salmon. The fry took to this food very readily and thrived upon it to such an extent that I took immediate steps to secure a bountiful supply. Accordingly, I dispatched a crew of fishermen to the Willamette Falls at Oregon City, where the supply of eel was known to have been enormous; but, inasmuch as the discovery of the fish food value of the eel was not substantiated until the run of the food fish was practically over, only a comparatively small amount was secured. However, arrangements have been made for an early and extensive take of lamper eel next season, and it is to be hoped that a sufficient quantity will be secured to meet with our every need.

HATCHERY OPERATIONS.

DISTRICT No. "1."

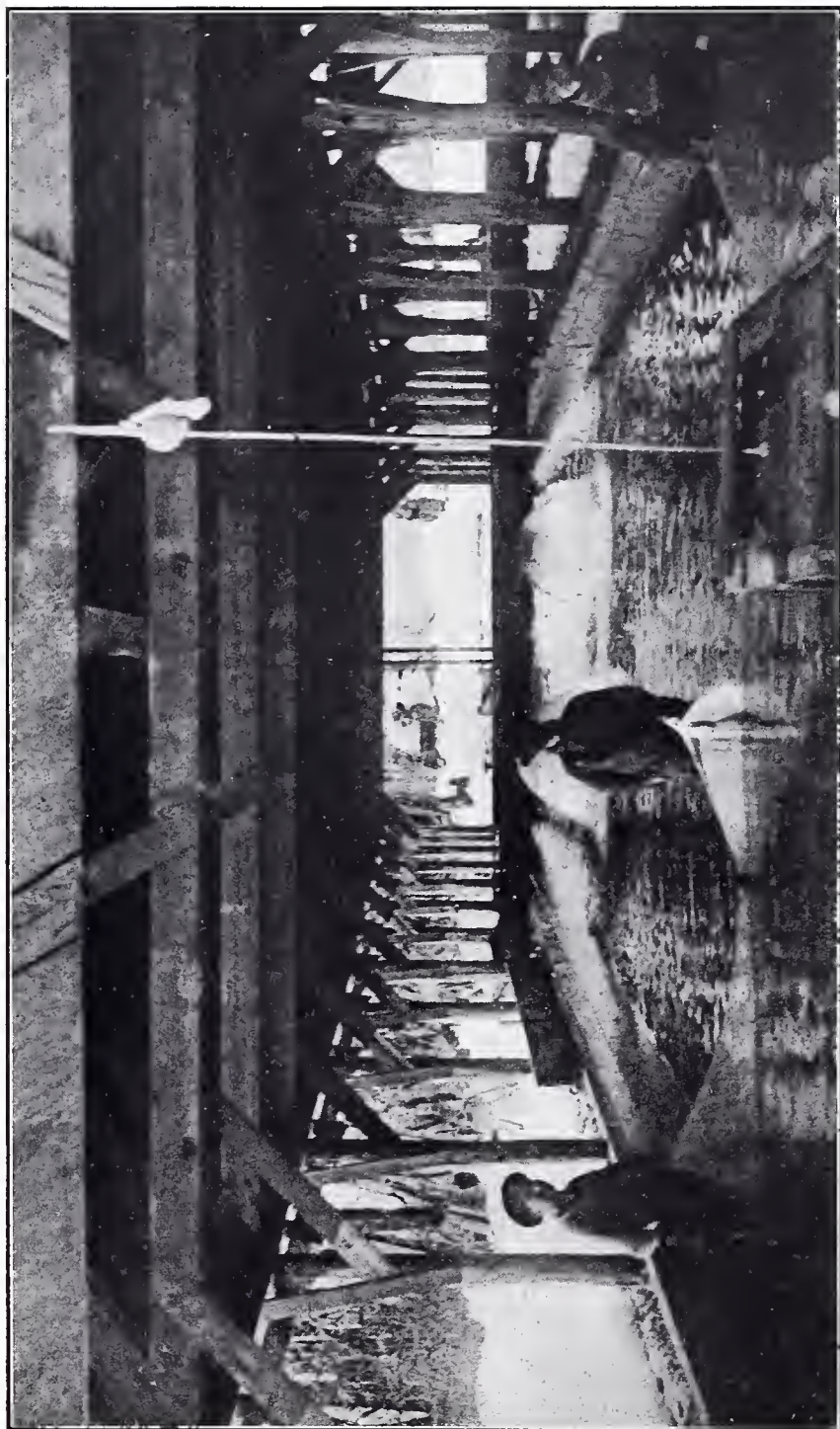
Considering the matter from a practical and beneficial standpoint, I think it can safely be said, that the hatchery operations

carried on by the department during the year was far more successful than during any like period since artificial propagation work was first undertaken by the State, as will be shown in detail later. Hatchery work was carried on at ten of the stations, resulting in an output of over 25,000,000 salmon fry, the most of which were strong and healthy when liberated into our various salmon producing streams.

It is true that the records on file in our office show that a larger amount of spawn taken and more fry hatched during some of the preceding seasons, but practically all of the fry were then turned out to shift for themselves as soon as the yolk sac was absorbed. Consequently, millions of the tiny helpless creatures were devoured by the hordes of predatory fishes which frequented the streams near the hatcheries, apparently for the purpose of preying on these easy victims, and large numbers of the salmon fry that succeeded in escaping their natural enemies became stranded in shallow pools along the larger streams and were left to die when the water receded. From the following reports of the work carried on at the different hatcheries, it will be seen that the larger part of the fry handled were held and fed in the hatching troughs and nursery ponds from three to seven months, thereby attaining a size of from two and one-half to five inches in length, which undoubtedly better equipped them for their journey to the ocean and it is beyond a question of doubt but what a larger per cent will live to eventually return to their native streams to increase the output of our fisheries.

BONNEVILLE CENTRAL HATCHERY.

On account of being better equipped with nursery ponds and other means for caring for the young fry, the most of our hatchery work of the Columbia River District was carried on at the Bonneville Central Hatchery Station. Eggs were taken from the other hatcheries and substations in the district, after reaching the eyed stage and transferred to this station for attention. As set forth in my previous report, there was received during the fall and winter of 1910, a total of 7,262,000 eggs of the early Chinook variety of salmon, as follows: From the McKenzie River Hatchery, 2,120,000 eggs; Wallowa River Hatchery, 1,790,000 eggs; Salmon River Hatchery, 232,000 eggs; Umpqua River Hatchery, 2,520,000 eggs, and from the United States Bureau of Fisheries, 600,000 eggs. The United States Bureau of Fisheries also furnished this station with 3,350,000 Fall Chinook eggs and 1,500,000 Blueback (Sockeye) salmon eggs from the Yes Bay, Alaska Hatchery, making a grand total of 12,112,000 salmon spawn received. According to the report of Superintendent Greenman, of the hatchery, there were 202,224 eggs and fry lost during the incubation period and 1,019,160 escaped by reason of the lower ponds being flooded by freshets from Tanner



Cleaning Nursery Pond at the Bonneville Central Hatchery

Creek. This left a balance of 10,890,616 fry and eggs on hand at the beginning of the year. The report also shows that all of these were held and fed in the retaining ponds until May 24th of the present year. Between this date and June 1st, the backwater into Tanner Creek from the Columbia River flooded the lower ponds and liberated 7,459,317 Chinook fry. The balance, or 3,431,299 fry, was retained in the upper ponds and liberated at different intervals from June 1st to October 16th. The fry which was liberated by the flood, because of being accustomed to receiving their food supply there, did not leave but remained in the vicinity until the receding water carried them away. Large numbers of them ascended Tanner Creek, some as far as the falls, one mile above the hatchery, and could be found in the pools throughout the summer; others drifted into the Columbia, turned upstream and ascended into Eagle Creek, a mile above where they could be seen in great numbers until the fall rains of October came when most of them disappeared. Close observation was kept upon the fry in these two streams, and while it was found that they put forth a vigorous growth, it was not equal to that attained by those retained and fed in the artificial ponds at the hatchery.

In addition to the above, 1,045,000 Steelhead eggs were received from the Tillamook hatchery at this station during March of this year. The resulting fry were held and fed until September, when they were liberated into the Columbia River.

Resulting from eggs received from the hatcheries and sub-stations in this district, and the United States Bureau of Fisheries, there was on hand at this station at the close of this report, 3,707,500 eggs and fry of the early Chinook variety of salmon from the other hatcheries in the district; 8,019,000 of the Fall variety of Chinook eggs and fry from the United States Bureau of Fisheries' Hatchery at White Salmon, and 2,000,000 Blueback eggs and fry from the United States Bureau of Fisheries' Hatchery at Yes Bay, Alaska, making a total of 13,726,500 eggs and fry on hand at the close of the year.

KLASKANINE RIVER HATCHERY.

As will hereinafter be noted, provisions were made by the last session of the legislature for the establishment of this station, and, in order to have everything in readiness for the season's work early in the fall, the construction and equipment of the hatchery building was rushed to completion so that spawn in the eyed stage could be transferred thereto from the different egg-taking stations, which was done, as follows:

From the McKenzie River Hatchery.....	1,300,000
Santiam River Station.....	790,000
Wallowa River Hatchery.....	355,000
Willamette River Station.....	198,550
	<hr/> 2,643,550

A portion of these eggs have already hatched and the fry resulting therefrom will be held and fed in the nursery ponds, preparations for which are already under way.

McKENZIE RIVER HATCHERY.

At this station we were again unfortunate in the breaking of the racks that had been placed across the river for the purpose of stopping fish to be used in securing spawn. The spring freshet was unusually high and, although extra precaution had been taken to strengthen the racks so that they would not go out as they had in the previous year, a large quantity of drift wood was brought down and this jamming against the structure caused a portion of it to go out, allowing a large number of the parent fish to escape upstream. Notwithstanding this set-back, we were able to secure 4,197,500 Chinook eggs from the early variety of salmon, 51,500 of these were lost during the hatching period, 140,000 were ultimately hatched and placed in the nursery ponds, and the remainder, 4,006,000, were sent to the Bonneville and Klaskanine River Hatcheries.



Superintendent's Dwelling and Hatchery Building at the McKenzie River Hatchery.

WILLAMETTE EYEING STATION.

Desiring to increase our take of spawn of the Spring Chinook, an investigation was made along the Willamette River, between Jasper and Lowell, last summer for the purpose of locating a suit-

able point where racks could be placed to stop the salmon on their way to the spawning grounds. What was considered to be the best spot was near Lowell, and Mr. Charles Roadarmel with a crew of men was sent to the place in the early part of April, this year, for the purpose of installing the racks. After considerable delay, due to the rack lumber not arriving, he finally completed the work on May 1st. A large number of fish put in their appearance at once, and the prospects were good for a most favorable season when, on May 15th, an unexpected rise in the river brought down a quantity of drift. This formed a dam against the rack and it was undermined and washed out. As the bar on which the rack had first been located was washed away, it was necessary in placing it again to locate farther down stream. On May 25th, ten days later, the rack was again in position to intercept the upward bound salmon, but the bulk of the Spring Chinook had passed and only a small number of eggs was secured. The take for the season amounted to 205,385.

SANTIAM EYEING STATION.

Racks were placed across the Santiam River about one mile above Jefferson during the spring of 1909, but owing to a rise in the river, which allowed the fish impounded at the stop rack to escape around the end, the work at that time was a failure. As the rack material and troughs were stored on the banks of the river nearby, and as no great expense would be incurred, I decided to replace the racks in the stream during the spring of this year. The work proved to be entirely successful, as we succeeded in taking 1,493,570 Spring Chinook eggs, of which 1,160,000 were shipped to the Bonneville and Klaskanine Hatcheries.

WALLOWA RIVER HATCHERY.

As stated in my previous report, upon the liberation of the 32,000 Chinook salmon fry held at this station resulting from the egg take of 1910, the hatchery was closed down and placed in charge of a caretaker until April 1st, at which time preparations were made for the taking of Steelhead spawn, and before the season was over were successful in securing 1,025,300 eggs from this specie of fish. Owing to the low stage of water, it was necessary to liberate 300,000 of the fry resulting from the Steelhead eggs in the Wallowa River during the latter part of June and the fore part of July, while the remaining 505,450 fry, less a loss of 112,244, were liberated at different intervals between August 3d and October 25th. 290,000 of the above number being planted in Wallowa Lake.

While the Steelhead work was in progress, arrangements were also being made for the taking of Chinook spawn later in the fall,

from which specie of fish we succeeded in taking 684,400 eggs; 587,000 of which were afterwards transferred to the Bonneville Central Hatchery and the remaining eggs hatched at that station and the resulting fry, amounting to 36,975, were planted in the Wallowa River during the month of December, immediately before the cold weather set in. This past season proved very unfavorable for Chinook work at this point owing to the long drought and late fall, which prevented the parent fish from ascending the Wallowa River in as large numbers as would under more favorable circumstances.

SALMON RIVER HATCHERY.

While this plant is well equipped in every particular for handling a large number of eggs and fry, our experience in operating in the last four years was very disappointing, not enough spawn being secured to justify the expense involved. Consequently, we decided not to operate the station during the year. The buildings were made secure and a nearby resident was engaged at a nominal salary to look after the plant.

In former years the Sandy River, of which Salmon River is a tributary, was one of the best spawning streams putting into the Columbia River. During the flood of 1904, however, a great mass of sediment and drift lodged at the mouth of the Sandy, causing it to form a new channel which emptied into the Columbia in an upstream direction, making it rather difficult for the fish to find. During the summer of this year, a number of residents along the Sandy, realizing that the diversion of the channel was the probable cause of the scarcity of fish, appealed to the department for assistance in getting the stream back to its old course. Acting under instructions from your body, I accordingly furnished them with 500 pounds of powder, with which they succeeded in removing a large amount of debris and opening up the channel to such an extent that quite a volume of water flowed through same. It is hoped that the winter freshets will wash away the balance of the sediment and drift in the old channel, thus deepening same and allowing the main portion of the river to again empty into the Columbia in a down stream direction.

ONTARIO HATCHERY.

This station not having been operated for a number of years, acting under orders from your body, I dismantled the plant and moved all the troughs and other equipment, consisting of seven car loads, to the Bonneville Central Hatchery. Through the courtesy of the Oregon-Washington Railroad & Navigation Company, we

were able to do this at a very nominal expense, as the material was transported free of charge.

GENERAL SUMMARY OF HATCHERY OPERATIONS.

FRY LIBERATED.

From the preceding pages it will be noticed that 10,855,111 Chinook, 1,488,327 Sockeye and 1,680,037 Steelhead fry were liberated into the Columbia River and its tributaries in the State of Oregon during the past season. The Chinook fry at the McKenzie River Hatchery were placed in a large pond in the fall of 1910, but were not liberated therefrom until in the spring of 1911.

TABLE.

Showing the number of fry liberated into the water of the Columbia River and its tributaries in the State of Oregon during the year 1911.

Station.	Chinook.	Sockeye.	Steelhead.	Where Liberated.
Bonneville.....	10,518,515	1,488,327	876,831	Tanner Creek. Wallowa River and Lake McKenzie River. Meacham Creek.
Wallowa.....	36,975	.....	693,206	
McKenzie River.....	299,621	.....	35,000	
Meacham.....	.....	.....	75,000	
Total.....	10,855,111	1,488,327	1,680,037	

SPAWN SECURED.

During the past year the department succeeded in taking 6,580,855 Early Chinook, 40,500 Late Chinook and 1,025,300 Steelhead eggs on the Columbia River and its tributaries in the State of Oregon, making a total of 7,646,655 eggs, as will be seen by the following:

TABLE.

Showing the number of eggs secured from the different species of salmon at the hatcheries operated by the State of Oregon tributary to the Columbia River, during the year 1911:

Station.	Early Chinooks.	Late Chinooks.	Steelheads.	Totals.
McKenzie.....	4,197,500	.....	.....	4,197,500
Santiam.....	1,493,570	.....	.....	1,493,570
Willamette.....	205,385	.....	.....	205,385
Wallowa.....	684,400	.....	1,025,300	1,709,700
Bonneville.....	.....	40,500	.....	40,500
Total.....	6,580,855	40,500	1,025,300	7,646,655

DISTRICT No. "2."**SALMON INDUSTRY.**

From reports furnished me by the canners, packers, dealers and others engaged in the handling of salmon in a commercial manner in Fishing District No. "2," which embraces all of the streams in the State of Oregon flowing into the Pacific Ocean south of the Columbia River, find that the following amounts of the different species of salmon were handled:

Chinook.....	3,096,286 pounds.
Silverside.....	7,130,833 pounds.
Steelhead.....	46,067 pounds.
Chum.....	595,241 pounds.

These figures, like the statement for District No. "1," do not include the amount of this product consumed by private individuals, statistics of which are unobtainable, although it is considerable. However, the foregoing will give a person a general idea as to the magnitude of the industry.

TABLE.

Showing the salmon product of the streams in the State of Oregon flowing into the Pacific Ocean south of the Columbia River for the years from 1901 to 1911, both inclusive:

Year.	Chinook, Number of Pounds.	Silverside, Number of Pounds.	Steelhead, Number of Pounds.	Chum, Number of Pounds.	Total Number of Pounds.
1901.....	689,338	2,990,462	76,999	614,819	4,371,618
1902.....	751,123	2,068,760	26,060	556,860	3,402,803
1903.....	1,254,927	2,830,272	46,426	418,060	4,549,685
1904.....	1,668,000	3,316,040	232,100	683,400	5,899,540
1905.....	2,139,085	2,273,465	376,016	767,162	5,555,728
1906.....	2,018,980	4,721,000	67,000	236,710	7,043,690
1907.....	2,018,643	3,852,112	210,520	657,407	6,738,682
1908.....	1,049,864	4,660,937	298,802	412,908	6,422,511
1909.....	1,247,917	3,328,209	79,549	826,733	5,482,408
1910.....	2,445,874	5,426,261	151,414	342,107	8,365,656
1911.....	3,096,286	7,130,833	46,067	595,241	10,868,427

It will be seen from the foregoing that the Chinook pack this past year exceeded the Chinook pack of 1910 by 650,412 pounds, the Silverside pack showed an increase of 1,704,572 pounds, and the Chum pack 253,134 pounds, while the Steelhead product showed a falling off of 105,347 pounds. The shortage in the Steelhead pack does not signify the scarcity of this specie of fish, but is accounted for by the closing of Rogue River to salmon fishing, other than with hook and line. Had seine and net fishing been allowed in this stream the same as in former years, the salmon pack in this district during 1911 would have showed an increase of at least one million pounds more than is set forth in the above table.

ENFORCEMENT OF THE LAW.

The spring closed season for salmon fishing on the streams in the State of Oregon flowing into the Pacific Ocean, south of the



A Scow of Salmon for Delivery to one of the Canneries on a Coast Stream.

Columbia River, other than Rogue River, where other than hook and line fishing is not permitted at any time, extends from 6 a. m. on March 20th until 6 p. m. on July 15th, except on Yaquina Bay, where the closed season extends until 6 p. m. on July 16th, and on the Umpqua River, where the spring closed season only extends from April 10th to May 10th. Other than Rogue River, of course, the fall closed season period on the above streams extends from 6 a. m. on November 20th until 6 p. m. on December 10th, of each year, except on Tillamook Bay and its tributaries, which enables large numbers of adult salmon to reach the hatcheries and natural spawning grounds to deposit their eggs on the headwaters of the various streams. Owing to the large territory embraced in this district and the comparatively small amount of money at our disposal for the protection and propagation of salmon therein, we have been greatly handicapped in giving these streams the police patrol which same should have. Notwithstanding this condition of affairs, very little poaching has been carried on, most of which was fishing above the dead lines and monopolizing too large a portion of the rivers during the open seasons. From this source, the department collected \$133.32 in fines and \$33.00 from the sale of confiscated salmon and gear.

For your information I am submitting herein a statement showing the amount of revenue collected from the issuance of licenses on the different streams in this district, the total amount of which is \$11,889.97.

FISHING APPLIANCES, CANNERIES, ETC., OPERATED AND LICENSE FEES PAID.

	No.	Rate.	Amount.	Total.	Grand Total.
CLATSOP COUNTY—Necanicum River—					
Gill-nets.....	16	\$5.00	\$ 80.00		
Set-nets.....	29	2.50	72.50		
Dealers.....	5		30.00	\$ 182.50	
Elk Creek—					
Set-nets.....	3	2.50	\$ 7.50	\$ 7.50	\$ 190.00
TILLAMOOK COUNTY—Nehalem River—					
Gill-nets.....	38	5.00	\$190.00		
Set-nets.....	214	2.50	535.00		
Canners.....	2		300.00		
Cold Storages.....	2		65.00	\$1,090.00	
Tillamook Bay—					
Gill-nets.....	70	5.00	\$350.00		
Set-nets.....	282	2.50	705.00		
Seines.....	3		52.50		
Canners.....	2		350.00		
Cold Storages.....	3		230.00		
Dealers.....	35		212.50	\$ 1,900.00	
Nestucca Bay—					
Gill-nets.....	25	5.00	\$125.00		
Set-nets.....	94	2.50	235.00		
Seines.....	2		33.00		
Canners.....	1		200.00		
Cold Storage.....			30.00		
Dealers.....			257.50	\$ 880.50	\$ 3,870.50

FISHING APPLIANCES, CANNERIES, ETC., OPERATED AND LICENSE FEES PAID.—Continued.

	No.	Rate.	Amount.	Total.	Grand Total.
LINCOLN COUNTY—Salmon River—					
Set-nets.....	3	2.50	\$ 7.50	\$ 7.50	
Siletz River—					
Gill-nets.....	16	5.00	\$ 80.00		
Set-nets.....	54	2.50	135.00		
Canners.....	1		150.00		
Cold Storage.....	1		50.00		
Dealers.....	3		15.00	\$ 430.00	
Yaquina Bay—					
Gill-nets.....	43	5.00	\$215.00		
Set-nets.....	11	2.50	27.50		
Canners.....	1		100.00		
Jobbers.....	3		80.00		
Dealers.....	37		210.00	\$ 632.50	
Yachats River—					
Set-nets.....	3	2.50	\$ 7.50	\$ 7.50	
Beaver Creek—					
Set-nets.....	3	2.50	\$ 7.50	\$ 7.50	
Alsea Bay—					
Gill-nets.....	60	5.00	\$300.00		
Set-nets.....	132	2.50	330.00		
Seines.....	2		61.20		
Canners.....	2		500.00		
Cold Storage.....	2		75.00		
Dealers.....	1		5.00	\$1,271.20	\$2,356.20
LANE COUNTY—Siuslaw River—					
Gill-nets.....	42	5.00	\$210.00		
Set-nets.....	210	2.50	525.00		
Seines.....	2		43.20		
Canners.....	2		300.00		
Cold Storage.....	1		10.00		
Dealers.....	30		157.50	\$1,245.70	\$ 1,245.70
DOUGLAS COUNTY—Umpqua River—					
Gill-nets.....	53	5.00	\$265.00		
Set-nets.....	258	2.50	645.00		
Seines.....	2		64.80		
Canners.....	2		500.00		
Cold Storage.....	2		47.50		
Dealers.....	18		90.00	\$1,612.30	\$ 1,612.30
COOS COUNTY—Ten Mile Lake—					
Gill-nets.....	1	5.00	\$ 5.00		
Set-nets.....	2	2.50	5.00	\$ 10.00	
Coos Bay—					
Gill-nets.....	78	5.00	\$390.00		
Set-nets.....	64	2.50	160.00		
Seines.....	2		30.00		
Canners.....	2		450.00		
Cold Storage.....	2		75.00		
Fish Dealers.....	10		62.50	\$1,167.50	
Coquille River—					
Gill-nets.....	79	5.00	\$395.00		
Set-nets.....	97	2.50	242.50		
Seines.....	7		162.27		
Canners.....	2		350.00		
Dealers.....	13		65.00	\$1,214.77	\$ 2,392.27
CURRY COUNTY—Floras Creek—					
Gill-nets.....	3	5.00	\$ 15.00		
Set-nets.....	3	2.50	7.50	\$ 22.50	
Sixes River—					
Gill-nets.....	1	5.00	\$ 5.00		
Set-nets.....	4	2.50	10.00	\$ 15.00	

FISHING APPLIANCES, CANNERIES, ETC., OPERATED
AND LICENSE FEES PAID.—Continued.

	No.	Rate.	Amount.	Total.	Grand Total.
Pistol River— Seine.....	1		\$ 15.00	\$ 15.00	
Rogue River— Dealers.....	17		\$ 90.00	\$ 90.00	
Chetco River— Set-nets.....	1		2.50		
Seines.....	2		33.00		
Dealers.....	4		25.00	\$ 60.50	
Windchuck River— Gill-nets.....	1		\$ 5.00		
Seine.....	1		15.00	\$ 20.00	\$ 223.00
Total.....					\$11,889.97

HATCHERY OPERATIONS.

TILLAMOOK HATCHERY.

The results obtained from our hatchery operations at this station were very satisfactory, the output of fry showing a big increase over all former years since the plant was established. As previously reported, we succeeded in taking during the fall and winter of 1910, 2,033,000 Chinook eggs and 1,238,000 Silverside eggs, to which were added during March and April of the following spring 3,033,000 Steelhead spawn, making a total of 6,305,000 eggs for the season. In order to relieve the congested conditions at the hatchery where we were hampered on account of not having sufficient water, we installed twelve troughs in the small stream near the racks. With this additional equipment we were still unable to properly handle all the Steelhead spawn and subsequently shipped 765,000 of these eggs to the Bonneville Central Hatchery. After the water began to fall in the spring, we made a large pond by placing a dam at the mouth of the small creek above the racks, with which, in addition to the troughs and artificial ponds at the hatchery, we were able to hold and feed a large percent of the fry for a considerable time. As the fry developed it was found necessary to thin them out from time to time, which was done as follows:

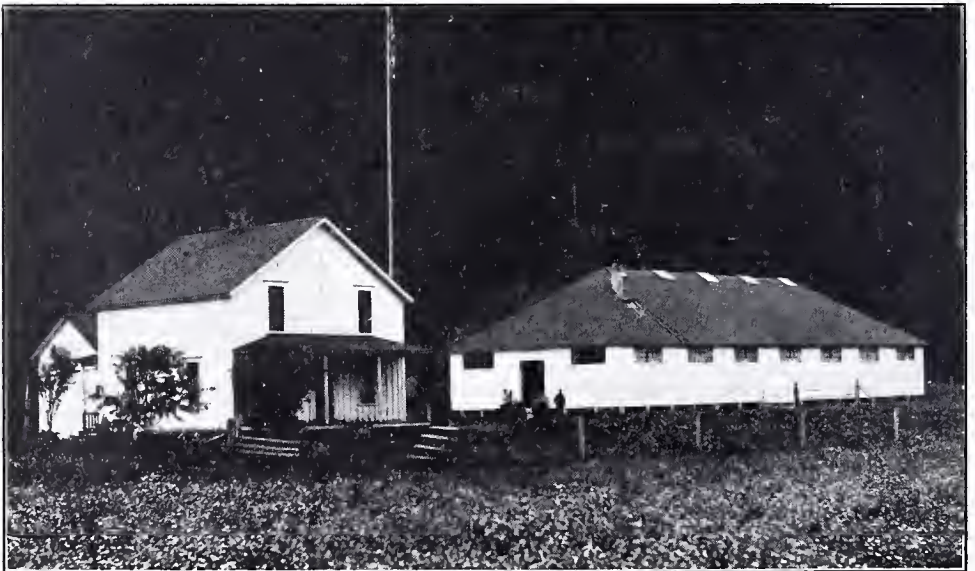
February 27th liberated.....	800,000
March 15th to 30th liberated.....	235,000
April 20th liberated.....	325,000
May 25th liberated.....	300,000
June 25th liberated.....	728,000
July 10th liberated.....	468,000
August 15th liberated.....	250,000
October 1st liberated.....	250,000

Superintendent Miller reported that he had had very little trouble with the young salmon while they were being held in the nursery ponds and that they were all in fine healthy condition when they were turned loose in the Trask River to shift for themselves.

During the fall and winter of 1911, we have secured 738,000 Chinook eggs and 2,940,000 Silverside eggs to date, with a large number of parent fish of the latter specie still behind the racks.

YAQUINA HATCHERY.

As previously reported, the low water in Elk Creek made it impossible for the Chinooks to get up to our racks and the take of spawn from this specie of fish was almost a failure, only 100,000 eggs having been secured. As more Chinook eggs were collected at the Umpqua River Hatchery than could possibly be handled there, 500,000 thereof were transferred to this station. The fall rains brought the Silversides up in great numbers and 3,000,000 eggs of this variety were taken. A great many more could have been secured had we been in a position to handle them, but after filling the hatchery the gates in the rack were opened and many thousands of fish ascended the stream to spawn naturally. During the following spring 925,000 Steelhead eggs were taken, making a total of 4,525,000 for our season's efforts.



Yaquina Hatchery and Superintendent's Dwelling in Foreground

The first fry were liberated on March 8th, when 50,000 Chinooks were allowed to go into Elk Creek, and before the end of the month

1,675,000 Silversides had been liberated in Elk and Bear creeks. During the latter part of May 532,785 Chinook and 200,000 Silver-side fry were set free. In June 812,650 more Silversides were released. The Steelhead fry were all retained until July 22d, between which date and the end of the month 125,000 were liberated into Elk Creek, while the remaining Steelheads were turned out between August 21st and 28th.

The take of Chinook spawn so far this season (1911) has been very unsatisfactory, the low water again interfering with the operations. We have been more fortunate, however, with the Silver-side specie again, and now have on hand 1,000,000 eggs, with enough parent fish in evidence behind the racks to indicate that, with the Steelhead spawn to be taken later, the plant will be filled to its capacity.

ALSEA HATCHERY STATION.

A temporary hatching station was established on the Alsea River by former Master Fish Warden Van Dusen in 1907, but after being operated for one season it was for some reason discontinued. As I had been much impressed with the Alsea as a fishing stream when I was acting in the capacity of deputy for that district, upon assuming the office I immediately took up the matter of resuming operations on this stream with the former Board. Having received the permission of that body to proceed with the work, an investigation was made late in the summer of 1910 and a site selected near where the troughs and the other equipment of the former station had been stored. Mr. E. E. Cook, for a number of years an employee of the Yaquina Station, was placed in charge of the work as superintendent. Temporary sheds, under which the hatchery troughs were set up, were constructed as we did not desire to make a permanent establishment until we were satisfied that the location was suitable in every way. As the season was so far advanced before we had the racks installed in the river, we only succeeded in taking 112,000 eggs, but, in order to make it worth while to operate the station, a shipment of 450,000 Chinook eggs was made from the Umpqua Hatchery. On account of the small number of fry, we were enabled to hold the entire number in the troughs until we could build two artificial ponds in an old creek bed nearby, after the spring freshet had gone down. Here all the young fish were placed and held until they attained a size of from three to four inches in length.

The take of Chinook this fall was again small at this station, only 328,000 eggs being secured. The Silver-side work, however, proved more effective as we secured 1,410,000 eggs from this specie of fish for this season's operations.

SIUSLAW RIVER HATCHERY.

As set forth in my previous report, we were again unfortunate in the taking of Chinook spawn at this station in 1910, for the reason that the low stage of the river during the spawning season prevented the parent fish from reaching the racks. Later on, while the Silversides were being held below the racks, a freshet occurred damaging the racks and allowing the fish to ascend up the streams. However, we succeeded in securing 205,500 Chinook and 23,000 Silverside eggs. In order to render the operations of the hatchery profitable for the season, 412,000 eggs of the early Chinook variety were shipped to this station from the Umpqua Hatchery. During the spring of 1911 we secured 292,000 Steelhead eggs, which gave us a total of 932,000 eggs for the season upon which to operate. Deducting a normal loss of eggs and fry during the process of incubation, an aggregate of 898,000 fry, resulting therefrom, were held and fed in the troughs and nursery ponds, and liberated as follows:

April 30th liberated.....	221,000
May 15th to 25th liberated.....	395,000
June 10th to 21st liberated.....	180,000
July 15th liberated.....	102,000

Although we have substantial racks across this stream, one of the most serious drawbacks to the successful operation of this plant is the logging operations which are carried on every season. The drives of logs usually occur during the freshets and the logs jam against the dam and frequently cause considerable damage to same. In order to allow the logs free passage down the stream, we are also required to provide gates in the dam, and when these are opened to permit logs to pass through, many of the fish are allowed to escape. Thus far this season we have taken 335,000 Chinook and 456,700 Silverside eggs. We also received a shipment of 406,000 Chinook eggs from the Umpqua station, which gives the hatchery 1,197,700 eggs, less a nominal loss during the incubation with which to begin the coming year's work.

UMPQUA RIVER HATCHERY.

Our operations at this station during the egg taking season of 1910 resulted in a take of 6,699,700 eggs of the spring Chinook salmon. Not being equipped with sufficient nursery ponds in which to hold and feed such a large quantity of fry, the larger part of the spawn necessarily had to be transferred to other state hatcheries, upon reaching the eyed stage. The Bonneville Central Hatchery received 2,520,000 of these, and 1,356,000 others were distributed around some of the less fortunate coast hatcheries. After deducting the loss of fry and eggs during incubation, we had 2,559,080 eggs with which to begin the year's work in 1911. As food for the fry we had to feed almost entirely dried salmon, prepared the previous fall, as we



Stripping Salmon of Their Eggs and Milt.

were unable to get other varieties. Notwithstanding this straight diet, when we consider the time that they were held in the ponds, the loss was remarkably small. Only 16,644 died out of the original 2,559,080 fry on hand.

All of these fish were retained in the troughs and ponds until March 31st, when, owing to the crowded conditions, 1,000,000 were liberated at different points along the Umpqua River near the station. Between May 20th and 28th, one million more were allowed to go in the same stream. The balance, 541,236, were held until July 10th, when they were also distributed in the same manner.

The Umpqua, as you are aware, is the only stream besides the Columbia upon which we operate for the spring Chinook spawn. While numbers of Steelheads ascend the stream early in the spring in advance of the Chinook, the high water of the river at this particular time prevents us from holding racks across the river. Therefore, we have not taken spawn of this variety of fish. As the Steelhead is of vast importance as a fish commercially in the Umpqua, I was desirous of doing some propagation work on this specie, and, therefore, transferred eggs from the Tillamook station, where we had secured more than we could properly care for. The resulting fry were held and fed until July 15th, when they were allowed to go into the Umpqua on their migration to the sea.

SOUTH COOS RIVER HATCHERY.

During the past egg taking season, 2,885,000 Chinook and 1,170,000 Silverside eggs were taken at this station. This provided us with ample spawn with which to conduct the year's operations. The extreme high water, during the early part of February, washed out a portion of the bank of the stream and precipitated a section of the hatchery building into the river. This disaster interfered somewhat with the operations of the plant, but none of the eggs or fry was lost, as all had been transferred to the main part of the hatchery before the cave-in took place.

Of the Silverside spawn taken, 998,000 eggs were transferred to the Coquille Hatchery, as were also 502,000 eggs of the Chinook variety. The Chinook and Silverside fry remaining at the South Coos River Hatchery were held and fed in the troughs and artificial nursery ponds at the station until April 30th, after which they were transferred to the creek nearby, where they were fed for a month longer. The principal food upon which these fry were sustained was milk curd, obtained from the creameries at Marshfield, and when they were liberated at different intervals they had attained an average size of three inches in length and all were in fine, healthy condition. For the coming year's operations we have secured 2,092,695 Chinook and 2,399,000 Silverside eggs, making a total of 4,491,695 eggs which are being held at the station at this date.

COQUILLE RIVER HATCHERY.

The total number of Chinook eggs handled at this hatchery this season was 502,000, and 998,000 eggs of the Silverside variety, which were originally transferred from the South Coos River Hatchery. The fry resulting from these eggs, the loss being very small, were held in the troughs and nursery ponds at the station until May 1st, between which date and June 1st, they were liberated at different intervals in the Coquille River. This hatchery is operated in conjunction with the South Coos River Hatchery and is under the supervision of Superintendent Frank W. Smith, of the latter station. For several years it has been the practice to transfer eggs from the South Coos Hatchery; but, as the Chinook runs are increasing on the Coquille, we decided to take eggs from this stream. With this object in view, a dam was placed across the river near the hatchery.

On account of the low stage of the Coquille River this past fall the Chinook salmon were unable to reach this station in very large numbers and, therefore, only succeeded in securing 76,000 eggs from this specie of eggs. We were better rewarded, however, in our efforts with the Silversides, inasmuch as we invariably have freshets before this run of fish is over, which allow large numbers of them to ascend the Coquille. From this latter variety we were successful in securing 1,894,500 eggs, which, with the Chinook eggs, will be cared for and the resulting fry liberated into the Coquille River late in the coming spring or early summer.

GENERAL SUMMARY OF HATCHERY OPERATIONS.

FRY LIBERATED.

From the foregoing it will be noticed that 8,907,118 Chinook, 4,749,319 Silverside and 2,338,591 Steelhead fry were liberated into the various streams in this district during the year 1911, itemized statement of which will be seen by the following:

TABLE.

Showing the number of fry liberated into the waters of the coast streams south of the Columbia River, by the State of Oregon, during the year 1911:

Hatchery.	Chinooks.	Silversides.	Steelheads.	Where Liberated.
Tillamook.....	1,818,245	1,080,000	1,196,000	Trask River.
Yaquina.....	582,785	2,637,550	621,015	Big Elk Creek.
Alsea.....	495,950	30,300	.....	Alsea River.
Siuslaw.....	594,702	20,693	227,580	Lake Creek.
Umpqua.....	2,541,236	.....	293,996	Umpqua River.
South Coos.....	2,374,200	.....	.....	South Coos River.
Coquille.....	500,000	980,770	.....	Coquille River.
Total.....	8,907,118	4,749,319	2,338,591	



Picking Salmon Eggs.

SPAWN SECURED.

Although the egg-taking season at a number of the hatcheries is still in full blast, the department has so far succeeded in taking 5,399,795 Chinook, 7,573,200 Silverside and 4,250,500 Steelhead eggs, making a total of 17,223,495 eggs, full details of which will be seen in the following:

TABLE.

Showing the number of salmon eggs taken at the different hatcheries on the coast streams, in the State of Oregon, south of the Columbia River during 1911:

Hatchery.	Chinooks.	Silversides.	Steelheads.
Tillamook.....	738,000	413,000	3,033,000
Yaquina.....	162,000	1,000,000	925,000
Alsea.....	328,000	1,410,000	.....
Siuslaw.....	335,000	456,700	292,500
Umpqua.....	1,673,100	.....	.....
South Coos.....	2,092,695	2,399,000	.....
Coquille.....	76,000	1,894,500	.....
Total.....	5,404,795	7,573,200	4,250,500

GENERAL IMPROVEMENTS—BOTH DISTRICTS.

KLASKANINE RIVER HATCHERY.

The last session of the legislature made an appropriation of \$5,000.00 for the purpose of establishing and maintaining a hatchery on Youngs River or one of its tributaries in this state. After looking over all streams flowing into Youngs River and making a careful investigation of each, what was considered the most suitable site was selected at a point on the north fork of the Klaskanine River, about two miles above Olney, on the Guillaume farm. This site, consisting of five acres with a flume right-of-way, was decided on after a most thorough consideration, for the reason that a smaller stream, putting into the Klaskanine at that point could easily be diverted so as to give an adequate supply for the hatchery as well as for the nursery pond system. Submitting my findings to the former Board, together with plans for the hatchery, the plans were adopted as presented, and work ordered to proceed accordingly. Inasmuch as it might be, and was, found necessary to alter the plans to meet conditions encountered as the work progressed, it was decided to build the hatchery by days' labor, under supervision of a competent man, rather than by contract, with a consequent rigidity of specifications. This idea worked out very successfully. Mr. Frithiof Kankkonen, of Astoria, was employed as superintendent in charge of the work. A substantial frame building, 100 feet by 55 feet 4 inches, was erected and equipped with 116 hatching troughs. A 1,400-foot flume, large enough to accommodate increased demands for water made by an enlarged hatchery, was built. A number of

retaining ponds are now being completed, and will be finished in time to take care of the fry when they are ready to be placed therein. Knowing that your honorable body had in view the increasing of the capacity of this hatchery as soon as funds should become available, all work has been arranged with that end in view. A six-room dwelling has been built for the superintendent, and it, together with the other work, has been constructed in a most substantial and workmanlike manner.

I anticipate that the Klaskanine Hatchery, by reason of its extremely favorable location, will prove one of the most valuable in the State. Among the advantages of the new hatchery are its nearness to tidewater, and the fact that there are many small streams in its immediate vicinity which may readily be brought under control for the retention of young fish, to say nothing of the large number of other streams in the neighborhood in which fish may safely be liberated—there to remain until their inclination leads them to the waters of Youngs Bay on their migration to the ocean.

UMPQUA RIVER HATCHERY.

The new hatchery building at the Umpqua station, near Glide in Douglas County, the material for which was placed on the ground last year and construction work begun, was completed during the early spring of this year, as was also the new dwelling for the superintendent of the hatchery. The hatchery building is 80 feet long by 55 feet and 4 inches in width, and contains 100 hatching troughs. The superintendent's dwelling is 32 feet long by 14 feet in width, two stories high, with a rear addition 20 feet long by 21 feet in width. This hatchery building is constructed along the most modern lines and equipped with the latest improvements in every respect, which is as well true of the superintendent's cottage. A six inch pipe line, 1,600 feet long, has been laid to furnish the necessary water supply for all purposes, and a number of retaining ponds have also been constructed in which to hold and feed the fry until they arrive at the proper size for safe liberation. The old hatchery building, located on the opposite side of the river, has been held intact as an auxiliary station to be used in cases of emergency to care for the surplus eggs and fry over the capacity of the new station. The old superintendent's dwelling, formerly used in connection with the old hatchery, has also been held intact and is being used as quarters for the laborers at the new station and for a storage house for tools and equipment.

REPAIRS.

SOUTH COOS RIVER HATCHERY.

As a result of one of the heaviest and most damaging freshets ever experienced in the history of the service, which occurred on the South Coos River and overflowed the banks, during the latter part of January of this year, the bank was washed away and the hatchery, which was located at this point, was undermined to such an extent that a portion of the building settled into the river. Owing to the fact that the possibilities of such a disaster had been realized and anticipated and had been guarded against by the previous riprapping of the bank at this point, there was no serious damage inflicted upon the building and the loss of eggs and fry was very slight. As soon as the water receded and the weather permitted, the main part of the building, to which all of the eggs and young fry had been removed, was moved to higher ground and out of danger of a repetition of the disaster. That portion of the building which had been washed into the stream was recovered, and the lumber used in the repair and improvement of the main building, as well as the actual damage accruing, did not exceed \$600.00. In order to provide against the further washing of the banks and the danger of a repetition of the occurrence, the banks have been heavily riprapped with large rocks fitted in and covered with dirt.

LAUNCH ASTORIA.

As the result of a leak which had sprung in the gasoline tank of the gasoline launch Astoria, the fumes of the escaping liquid had accumulated in the hold of the vessel to such a degree of density that, when one of the deputies was making a tour of inspection with a lantern, an explosion took place and the boat was set ablaze. Fortunately the launch was moored alongside the fire boat Geo. H. Williams and, when the flames belched forth they were immediately discovered and almost as speedily subdued, through the prompt and efficient services of the fireboat crew, and the damage incurred was reduced thereby to \$400.00. Had the conditions been less propitious the loss would have been almost, if not quite, total.

WORK ON FISHWAYS.

WILLAMETTE FALLS FISHWAY.

In accordance with the plans and specifications, as adopted by your Commission, following organization and an inspection of the conditions surrounding the same, I am pleased to report that the

work of repair and reconstruction of the fishway over the Willamette Falls at Oregon City has been carried to completion and the results have proven eminently satisfactory and a great improvement over previous conditions. The walls, being anchored to solid rock with one and one-half inch drift bolts and strongly reinforced with railroad iron, as well as several tons of one inch round iron, I feel certain, will withstand the most severe winter freshets or any shock they may be subjected to by reason of logs or other drift plunging over the dam. The highest jump from any rest pool up to the head of the ladder will not exceed two feet in any place, and, as the rest pools have a sufficient depth and width, the fish will have very little trouble in ascending the ladder. Owing to the importance of this undertaking, inasmuch as the state has been put to a great expense in making repairs to the walls every year since the original ladder was installed because of frailty and resultant damage from logs and other drift, and in the interest of permanency and efficiency, I gave the work my personal supervision, and, although we were handicapped at times, by reason of high water, which necessitated fluming the water over the works, we succeeded in erecting the walls in a satisfactory manner. I found it necessary, however, to make some changes in the original plans, as adopted by your Commission, as I could not get as good a gradient by placing the walls as provided for in the plans. The whole structure was overhauled and reconstructed with an eye to the future when extensive additions, reinforcements and enlargements may be made, giving further assurance as to its permanency and increasing its efficiency. While the work in its present state is a vast improvement over former conditions and the fish will be able to ascend the ladder with less difficulty, the matter should not be allowed to rest until the work is perfected to such an extent that the fish will not have the slightest difficulty in getting over, as the Willamette River is the most important tributary to the Columbia in the state and the salmon industry on the Columbia River depends largely upon the number of fish getting over the Falls to the natural spawning grounds above.

AMENT DAM SITUATION.

We had the same trouble with conditions existing in connection with this dam this year as we have had for a number of years and the problem still remains unsolved. The temporary fishway, built around the bulkhead at the break in the dam, on the north side of the river, in 1910, washed away during the flood of February of this year. A new company, composed of the stockholders of the defunct Golden Drift Mining Company, who were the original owners of the property, had been organized and had petitioned the court, the property being in the hands of a receiver, and secured permission to reconstruct or repair the breach in the dam which occurred in

the fall of 1909. Having been advised of this action, I proceeded to Medford and succeeded in getting an order of the court requiring the new company to construct a permanent fishway in conjunction with the reconstruction or repair work. Plans were drawn and agreed upon between the engineer of the company and myself, and the Company promised that the work would proceed as soon as conditions of the stream would permit. This Company started to and did repair the break in the dam and our deputy, who was kept on the ground to see that all of the conditions of the agreement were fulfilled, asked them why they did not start on the fishway. The officers in charge of the work promised that they would do so as soon as the breach in the dam had been repaired sufficiently to enable them to control the water. The result was that, when the repairs to the break had been mended, the Company's funds were exhausted and this Company failed with a lot of accumulated debts, and still no fishway. This reorganized Company also went into a receivership and, as all of the officers were non-residents of the state, I could not reach them through the court. While this new Company did not fulfill its agreement nor obey the mandates of the court, the repairs to the dam backed the water up and caused it to flow through the State's old fishway on the south side of the river and put that into operation. As most of the water still flowed through the gates in the new portion of the dam on the north side, the fish were attracted there by the greater volume of water and accumulated in great numbers in the holes below, but they could not get over. It became necessary to provide immediate relief for this contingency, so I again went before the court and, there being no funds credited to the defunct Company to defray the expenses, secured an order from the court permitting the state to put in the fishway and take a lien upon the property in the form of Receivership certificates. A man was put in charge of the work and a new fishway was temporarily constructed which, in a measure, relieved the conditions, as a large number of fish got over. Although a large number of fish were permitted to surmount the dam by means of the old state's fishway on the south side and the new temporary arrangement, thousands of fish destroyed themselves on the rocks below. Before the conditions are completely remedied, it will be necessary to construct a large and adequate fishway leading over the north side of the dam in accordance with the plans which have already been prepared.

FISHWAYS ON THE NORTH AND SOUTH FORKS OF THE UMPQUA RIVER.

The same trouble with which the department has been harrassed on the Rogue River in years past, in regard to fishways over dams in the stream, is being experienced this year on the north and south

forks of the Umpqua River. Being turbulent mountain streams, the same conditions of current, freshets, etc., exist upon these streams as are found upon the Rogue River. They are frequented with early runs of Chinook salmon and there is one obstruction upon each stream. In the early part of the year repair work was started on the dam on the north fork of the Umpqua River, at Winchester, which raised the crest of the dam four feet. Plans for a new fishway, to be put in on the south side to take the place of the one in operation on the north side, were submitted for my consideration. Upon making a personal investigation, I decided that the fishway as proposed in the plans would not meet the requirements and insisted that the fishway as located on the north side be left in operation, as it was a natural passageway for fish—the water running around the end of the dam giving the fish an easy water grade ascent. After a consultation with the management, it was decided to leave the fishway as it was and to blast out additional pools to make provision for seasonal freshets. It was also agreed that, in the event of a new dam being built to take the place of the old one, an additional fishway would be constructed on the south side.

At the same time I made an examination of the fishway over the dam on the south fork of the Umpqua River, at Roseburg, and found that the repair work which had been ordered done had been put in in such a frail manner that the fishway was damaged to such an extent that but few fish could ascend the stream through it. Upon taking the matter up with the management, I pointed out that the state would insist that more an adequate fishway be provided and that the same be constructed in a more substantial manner, to enable it to withstand the flood stages of the river. I also tried to prevail upon the management to construct an additional fishway on the south side of the dam, but did not meet with any encouragement, as the management took the stand that the law only compelled them to provide one fishway; that the old location had been selected by a former Master Fish Warden and they considered it beyond the power of the Commission to change it. However, an agreement was effected by which a concrete fishway was constructed to take the place of the old one under the supervision of the department. Deputy Warden Sandry was given supervision of the work and succeeded in building a concrete fishway, and no doubt, a large number of fish succeeded in getting up through it. Notwithstanding, this fishway was a great improvement over the old one, owing to its location, it is not sufficiently adequate to allow the fish to pass up the river as it should, and, as I have previously set forth, trouble will be experienced there until a passageway for the fish is provided on the south side of the dam. This dam is several hundred feet long and many of the fish come up on the south side of the river and are held up there and never succeed in finding the mouth of the fishway on the opposite side, resulting in great numbers killing

themselves in their efforts to get to the spawning grounds above. Not only are the salmon held up but the runs of trout are also stopped in their migrations to their natural spawning grounds, and, as a large number of people are living on the stretches of this stream above this obstruction, they are entitled to consideration. Everything possible should be done to get these fish over the obstruction, not only for the benefits of the residents on that portion of the stream above this obstruction, but for the future welfare of the salmon industry as well.

NEHALEM RIVER FALLS.

The department, at the request of the fishermen on the Nehalem River and the residents above the Falls thereon, through Deputy Warden Gor, made an investigation to determine whether salmon were held up at this obstruction. Although some of the salmon and other fish succeeded in surmounting the falls during the flood stage of the river, large numbers were being stopped when the stream was in its normal stage. With a view of remedying matters, arrangements were accordingly made with Mr. C. L. Doughney to blow out a passageway over the falls. After this work was completed, conditions were found to be very much improved, but upon further investigation during the period when the fish were running, it developed that, in order to make the fishway still more adequate, a small amount of additional work will have to be done, which will be taken up in the near future.

FISHWAYS IN STREAMS.

Considerable attention has been given the matter of securing better and more adequate fishways over obstructions in the streams of the state during the past year. A number of notices requiring new fishways to be built and necessary repairs made to others which had been damaged by floods and other causes, were served by our deputies, as well as the deputies of the Game Department. In most cases we found that the owners of the obstructions were willing to comply with the law and provide adequate ladders, provided that a man be furnished from this department who understands the work to supervise the construction of the ladder. A competent man was employed during the summer who devoted his entire time to the work and succeeded in installing a number of new fishways, under his personal supervision, and in reconstructing and repairing a number of other dams which had been damaged and rendered impractical and inadequate. In other cases, owners have been indifferent and refused to comply with the request of the department and we found it necessary to take them into court. A great deal has been accomplished in a remedial nature along this line, but there still remains much more to be done before the conditions

are perfected throughout the state. It is a well known fact that many salmon and trout are destroyed below these obstructions because of the inadequate passageways provided for the fish over them, and this work will be vigorously prosecuted until the desired results have been attained.

FISH EXHIBITS.

ASTORIA CENTENNIAL.

By permission of your Commission, arrangements were made for a fish and game exhibit at the Centennial Exposition, held at Astoria during the past summer, and, with the aid of five large aquaria tanks, which were furnished by the State Board of Agriculture, and an abundant supply of water which was provided at the expense of the Exposition management, we were enabled to make an excellent display of the native fish of all species, supplemented by an extensive collection of preserved native and deep-sea fish of all varieties. Aside from this, a miniature fish hatchery was operated showing small fry in all stages of incubation. This latter feature also included a display of young salmon and trout fry passing through the process of incubation. The exhibit, as a whole, which was in charge of Mr. John Talbert, attracted a great deal of attention. It proved to be the chief attraction on the grounds and elicited much favorable comment. It was a pronounced success in every particular and was highly beneficial to the public at large from an educational standpoint. All of the expenses attendant upon the exhibit, with the exception of that incurred in collecting the display, was borne by the Exposition management—including the water supply, which was excellent—who exerted every effort and did all in their power to make it a success.

OREGON STATE FAIR EXHIBIT.

At the request of the State Board of Agriculture, and the sanction of your Commission, to repeat the fisheries exhibit of the year previous, at the Oregon State Fair, I succeeded in assembling a very creditable collection of the different species of fish, eggs, etc., which were displayed in appropriate manner to serve as an educational feature as well as an attraction, and Mr. John Talbert was placed in charge. After the exhibit had been installed, however, we found that the water supply, which was obtained from the penitentiary and had been treated by the State Board of Health to cleanse it of its impurities, had a bad effect upon the fish and killed many of them. Although the supply of fish was replenished, the exhibit, as a whole, did not come up to the standard of the year previous when the water supply was obtained from a well upon the grounds.

TABLE.

Showing the entire product of salmon and other food and shell fishes taken from the State of Oregon, including the entire Columbia River, during the year 1911, and its relative comparison to the product of 1910:

Variety of Fish.	1910 Number of Pounds.	1911 Number of Pounds.	Increase, Number of Pounds.	Decrease, Number of Pounds.
Chinook salmon	20,565,041	34,115,925	13,550,884	
Silverside Salmon	9,873,481	10,726,160	852,679	
Blueback salmon	972,349	496,216		476,133
Steelhead salmon	3,349,005	2,266,387		1,082,618
Chum salmon	1,698,239	2,205,087	506,848	
Sturgeon	165,369	271,952	106,583	
*Shad	553,889	741,752	187,863	
*Smelt	272,478	174,639		97,839
*Catfish	14,267	7,988		6,279
*Tom Cod	12,083	15,206	3,123	
*Carp	4,690	4,153		537
*Black Bass	4,317	2,049		2,268
*Herring	11,114	10,780		334
*Flounders	20,033	19,715		318
*Perch	19,699	16,666		3,033
*Oysters	199,469	239,264	39,795	
*Clams	206,837	212,212	5,375	
*Crabs	227,660	328,633	100,973	
*Crawfish	9,490	10,640	1,150	
Totals	38,179,510	51,865,424	15,355,273	1,669,359

*Catch on the Washington side of the Columbia River not included.

RECEIPTS.

DISTRICT No. "1."
1911.

From licenses issued, as follows:

1,049 Gill nets at \$5.00		\$5,245.00
362 Set-nets at \$2.50		905.00
48 traps at \$25.00		1,200.00
6 scow wheels at \$25.00		150.00
24 stationary wheels at \$35.00		840.00
45 drag seines, 61,640 feet, at \$0.03		1,849.20
269 fish dealers (1st class) at \$5.00	\$1,345.00	
17 fish dealers (2d class) at \$7.50	127.50	
11 fish dealers (3d class) at \$10.00	110.00	
1 fish dealer (3d class, new) at \$30.00	30.00	
4 fish dealers (4th class) at \$15.00	60.00	
2 fish dealers (5th class) at \$20.00	40.00	
3 fish dealers (6th class) at \$25.00	75.00	
2 fish dealers (8th class) at \$40.00	80.00	
1 fish dealer (13th class) at \$100.00	100.00	
2 fish dealers (14th class) at \$125.00	250.00	
3 fish dealers (15th class) at \$160.00	480.00	
2 fish dealers (17th class) at \$270.00	540.00	
2 fish dealers (18th class) at \$360.00	720.00	
1 fish dealer (22d class) at \$720.00	720.00	4,677.50
2 cannery (3d class) at \$200.00	\$ 400.00	
1 cannery (4th class) at \$250.00	250.00	
3 cannery (5th class) at \$300.00	900.00	
3 cannery (8th class) at \$450.00	1,350.00	
1 cannery (16th class) at \$850.00	850.00	3,750.00
Total from licenses issued		\$18,616.70
From fines imposed for violations	\$ 654.96	
From sale of confiscated fish (salmon)	356.69	
From the sale of confiscated gear	225.00	1,236.65
From the sale of old lumber at the Ontario Hatchery		40.00
Total for District No. "1"		\$19,893.35

RECEIPTS.**DISTRICT No. "2."**

1911.

From licenses issued, as follows:

526 Gill-nets at \$5.00.....		\$ 2,630.00	
1,467 Set-nets at \$2.50.....		3,667.50	
27 Seines, 16,999 feet, at \$0.03.....		509.97	
198 fish dealers (1st class) at \$5.00.....	\$ 990.00		
1 fish dealers (1st class, new) at \$15.00.....	15.00		
11 fish dealers (2d class) at \$7.50.....	82.50		
9 fish dealers (3d class) at \$10.00.....	90.00		
2 fish dealers (3d class, new) at \$30.00.....	60.00		
5 fish dealers (4th class) at \$15.00.....	75.00		
2 fish dealers (4th class, new) at \$45.00.....	90.00		
2 fish dealers (7th class) at \$30.00.....	60.00		
1 fish dealer (8th class) at \$40.00.....	40.00		
4 fish dealers (9th class) at \$50.00.....	200.00		
1 fish dealer (12th class) at \$80.00.....	80.00		
1 fish dealer (13th class) at \$100.00.....	100.00		1,882.50
1 canner (1st class) at \$100.00.....	100.00		
2 cannors (first class, new) at \$300.00.....	600.00		
8 cannors (2d class) at \$150.00.....	1,200.00		
5 cannors (3d class) at \$200.00.....	1,000.00		
1 canner (5th class) at \$300.00.....	300.00		3,200.00
Total for licenses issued.....			\$11,889.97
From fines imposed for violations.....	\$ 133.32		
From the sale of confiscated gear.....	33.00		166.32
From the return of State Warrant No. 14281, drawn on October 8, 1902.....			1.00
Total for District No. "2".....			\$12,057.29

FINANCIAL STATEMENTS.**DISTRICT No. "1."****HATCHERY FUND.****CR.**

Balance on hand January 1, 1911.....		\$ 9.50	
Received from issuance of licenses.....	\$18,616.70		
Received from fines imposed.....	654.96		
Received from the sale of confiscated fish and gear.....	581.69		
Received from the sale of old lumber at the Ontario Hatchery.....	40.00	\$19,893.35	\$19,902.85

DR.

Water bailiffs.....	\$ 3,554.85		
Launch Astoria.....	2,175.01		
Oregon Patrol.....	1,006.16		
Additional patrol boats.....	203.32		
Publishing and printing notices closing streams.....	95.63	\$ 7,034.97	
Bonneville Central Hatchery.....	\$ 4,137.16		
McKenzie River Hatchery.....	808.64		
Willamette River Hatchery.....	432.01		
Santiam River Hatchery.....	42.50		
Wallowa River Hatchery.....	521.85		
Klaskanine River Hatchery.....	923.54	\$ 6,865.70	
State Superintendent of Hatcheries.....	\$ 135.16		
Board of Fish and Game Commissioners.....	75.65		
Office rent, stenographer hire.....	512.00		
Office furniture, typewriter, etc.....	236.50		
Sundries, including license books, applications, fish exhibits, etc.,	421.93	\$ 1,381.24	
Willamette Falls fishway, repairs.....	\$ 1,051.86	\$ 1,051.86	\$16,333.77
Balance on hand December 31, 1911.....			\$ 3,569.08

SPECIAL APPROPRIATION.

For the purpose of operating, maintaining and equipping salmon hatcheries on streams tributary to the Columbia River.—Chapter 208, Laws of 1911.

CR.

Amount of appropriation..... \$10,000.00

DISBURSEMENTS.

Bonneville Central Hatchery (portion of operating expenses).....	\$2,919.94	
McKenzie River Hatchery (portion of operating expenses).....	1,465.31	
Willamette River Hatchery (portion of operating expenses).....	786.41	
Santiam River Hatchery (portion of operating expenses).....	1,453.39	
Wallowa River Hatchery (portion of operating expenses).....	891.66	
Klaskanine River Hatchery (construction).....	2,483.29	\$10,000.00

Balance on hand December 31, 1911..... \$.00

SPECIAL APPROPRIATION.

For the purpose of establishing, erecting, constructing and equipping and maintaining and operating a suitable salmon hatchery on Youngs River or its tributaries.—Chapter 206, Laws of 1911.

Amount of appropriation..... \$5,000.00

DISBURSEMENTS.

Klaskanine River Hatchery.....	\$5,000.00
--------------------------------	------------

Balance on hand December 31, 1911..... \$.00

SPECIAL APPROPRIATION.

For the purpose of completing the equipment of the Bonneville Central Hatchery.—Chapter 208, Laws of 1911.

Amount of appropriation..... \$5,000.00

DISBURSEMENTS.

Bonneville Central Hatchery.....	\$4,816.48
----------------------------------	------------

Balance on hand December 31, 1911..... \$ 183.52

SPECIAL APPROPRIATION.

For the purpose of protecting salmon, sturgeon and other anadromous fish.—Chapter 234, Laws of 1909.

Balance of appropriation of hand January 1, 1911..... \$ 54.53

DISBURSEMENTS.

Expended during the year 1911.....	\$ 6.10
------------------------------------	---------

Balance on hand December 31, 1911..... \$ 48.43

DISTRICT No. "2."

HATCHERY FUND.

CR.

Balance on hand January 1, 1911.....		\$ 3,662.40
Received from issuance of licenses.....	\$11,889.97	
Received from fines imposed.....	133.32	
Received from sale of confiscations.....	33.00	
Received from the return of State Warrant No. 14281, drawn Oct. 8, 1902.....	1.00	
Amount deducted from voucher of W. H. Newman (Aug. 22, 1910).....	.50	\$12,057.79
		\$15,720.19

DISBURSEMENTS.

Water bailiffs.....	\$ 1,627.94	\$ 1,627.94	
Ament Fishway.....	\$ 905.11		
Nehalem Falls Fishway.....	76.00	981.11	
Tillamook Hatchery (portion of operating expenses).....	583.82		
Yaquina Hatchery (portion of operating expenses).....	766.75		
Alsea River Hatchery (portion of operating expenses).....	390.89		
Siuslaw River Hatchery (portion of operating expenses).....	573.89		
Umpqua River Hatchery (portion of operating expenses).....	647.33		
South Coos River Hatchery (portion of operating expenses).....	595.32		
Coquille River Hatchery (portion of operating expenses).....	477.47	4,035.47	
Umpqua River Hatchery (improvements).....	\$ 739.85		
South Coos River Hatchery (improvements).....	759.27	1,499.12	
Board of Fish and Game Commissioners.....	\$ 399.73	399.73	
State Superintendent of Hatcheries.....	\$ 136.71	136.71	
Furniture for office, cartage and freight, etc.....	179.20		
Office rent and stenographer hire.....	532.00		
Sundries, including license books, application blanks, etc.....	139.42	\$ 850.62	\$ 9,530.70
Balance on hand December 31, 1911.....			\$ 6,189.49

SPECIAL APPROPRIATION.

For purchasing necessary lands for salmon hatchery sites, for building, equipping, operating and maintaining salmon fish hatcheries on coast streams of the State of Oregon south of the Columbia River.—Chapter 209, Laws of 1911.

CR.

Amount of the appropriation.....\$20,000.00

DISBURSEMENTS.

Tillamook Hatchery (portion of operating expenses).....	\$1,235.49		
Yaquina Hatchery (portion of operating expenses).....	1,147.59		
Alsea River Hatchery (portion of operating expenses).....	1,638.06		
Siuslaw River Hatchery (portion of operating expenses).....	1,568.54		
Umpqua River Hatchery (portion of operating expenses).....	1,503.87		
South Coos River Hatchery (portion of operating expenses).....	1,394.60		
Coquille River Hatchery (portion of operating expenses).....	432.06	\$8,920.21	
Umpqua River Hatchery (improvements).....	\$2,379.52		
South Coos River Hatchery (improvements).....	781.25	3,160.77	\$12,080.98
Balance on hand December 31, 1911.....			\$ 7,919.02

SPECIAL APPROPRIATION.

For the payment of the salary and expenses of the Deputy Fish Warden for Fishing District No. 2. Chapter 88, Laws of 1911.

CR.

Amount of appropriation.....3,000.00

EXPENDITURES.

Salary for the year 1911.....	\$1,100.00		
Expenses for the year 1911.....	574.50	1,674.50	
Balance on hand December 31, 1911.....			\$1,325.50

SPECIAL APPROPRIATION.

For the payment of the salary and expenses of the Master Fish Warden, and the salary and expenses of the Deputy Fish Warden.—Chapter 88, Laws of 1911.

CR.

Amount of appropriation.....\$11,400.00

DISBURSEMENTS.

Salary of the Master Fish Warden for 1911.....	\$2,500.00		
Traveling expenses of the Master Fish Warden for 1911.....	\$863.15		
Office expenses of the Master Fish Warden during 1911.....	880.77	1,743.92	
Salary of the Deputy Fish Warden for 1911.....	1,119.35		
Expenses of Deputy Fish Warden for 1911.....	459.05	\$5,822.32	
Balance on hand December 31, 1911.....			\$5,577.68

SPECIAL APPROPRIATION.

For the payment of the salary of the clerk for the State Fish Warden's office.—Chapter 88, Laws of 1911.

Amount of appropriation..... \$3,000.00

DISBURSEMENTS.

Salary of clerk during 1911..... \$1,485.48

Balance on hand December 31, 1911..... \$1,514.52

RECAPITULATION OF RECEIPTS AND EXPENDITURES.

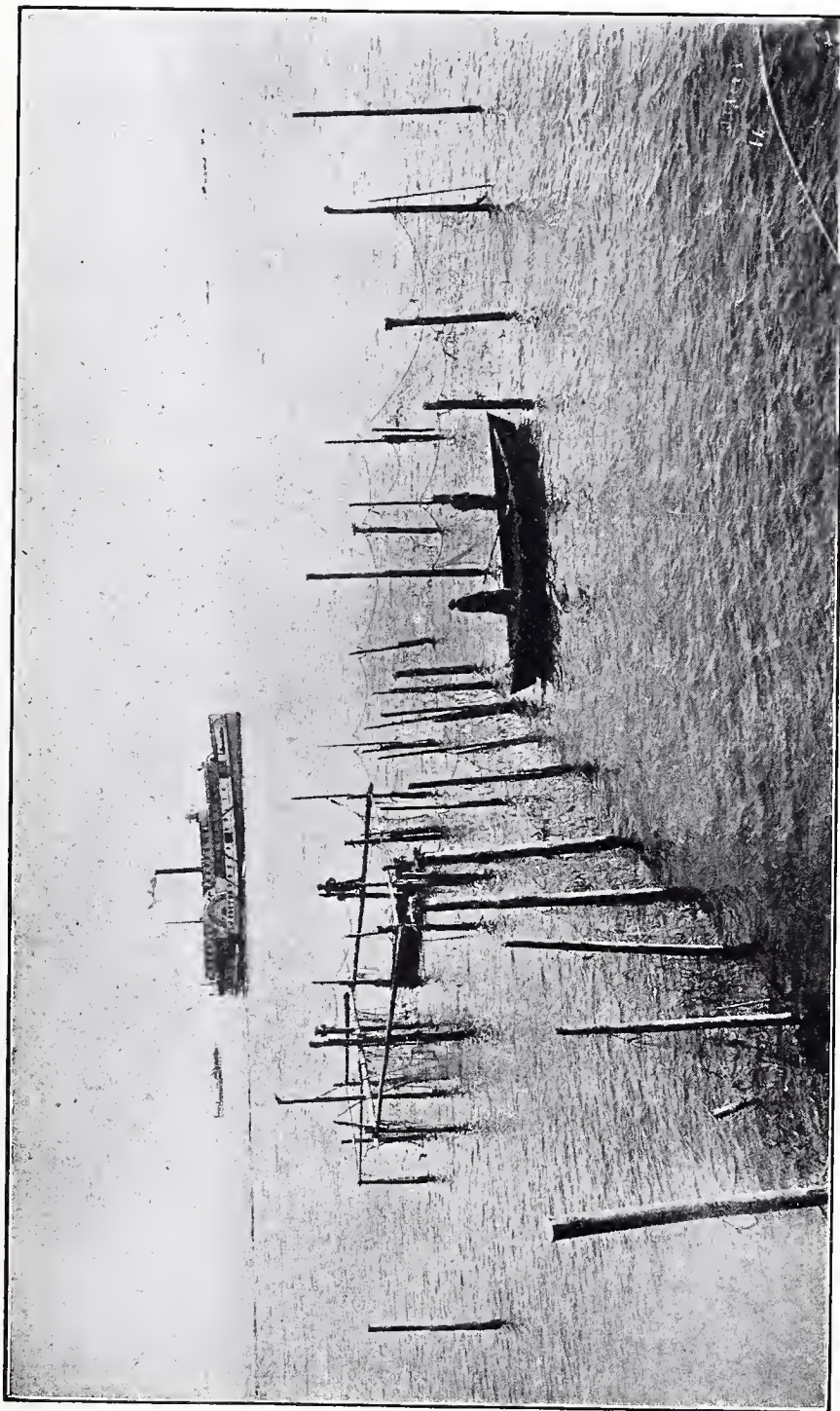
Amount on hand in Hatchery Fund for District No. 1, January 1, 1911.....	\$ 9.50	
Receipts for the year 1911.....	19,893.35	\$19,902.85
Amount appropriated for establishing, erecting, constructing and equipping and maintaining and operating a suitable salmon hatchery on Youngs River or its tributaries.....		5,000.00
Amount appropriated for completing the equipment of the Bonneville Central Hatchery.....		5,000.00
Amount appropriated for operating, maintaining and equipping salmon hatcheries on streams tributary to Columbia River....		10,000.00
Balance on hand January 1, 1911, of appropriation for protecting salmon, sturgeon and other anadromous fish.....		54.53
Amount on hand in Hatchery Fund for District No. 2, January 1, 1911.....	\$ 3,662.40	
Receipts for the year 1911.....	12,057.79	15,720.19
Amount appropriated for purchasing necessary lands, building, equipping, operating and maintaining coast stream hatcheries..		20,000.00
Amount appropriated for the salary and expenses of the Master Fish Warden and the Deputy Warden.....		11,400.00
Amount appropriated for the salary and expenses of the Deputy Fish Warden for Fishing District No. 2.....		3,000.00
Amount appropriated for the salary of clerk in State Fish Warden's office.....	3,000.00	\$93,077.57

DISBURSEMENTS.

Against the Hatchery fund for District No. 1.....	\$16,333.77	
Against the appropriation for establishing, erecting, constructing and equipping, maintaining, etc., salmon hatchery on Youngs River.....	5,000.00	
Against the appropriation for completing the equipment of the Bonneville Central Hatchery.....	4,816.48	
Against the appropriation for operating, maintaining and equipping salmon hatcheries on tributaries to Columbia River.....	10,000.00	
Against the appropriation for protecting salmon, sturgeon and other anadromous fish.....	6.10	
Against Hatchery Fund for District No. 2.....	9,530.70	
Against the appropriation for purchasing necessary lands, building, equipping, operating and maintaining coast stream hatcheries.....	12,080.98	
Against the appropriation for the salary and expenses of the Deputy Fish Warden for District No. 2.....	1,674.50	
Against the appropriation for the salary and expenses of the Master Fish Warden and the Deputy Warden.....	5,822.32	
Against the appropriation for the payment of the salary of the Clerk of the State Fish Warden's office.....	1,485.48	\$66,750.33
Balance on hand December 31, 1911.....		\$26,327.24



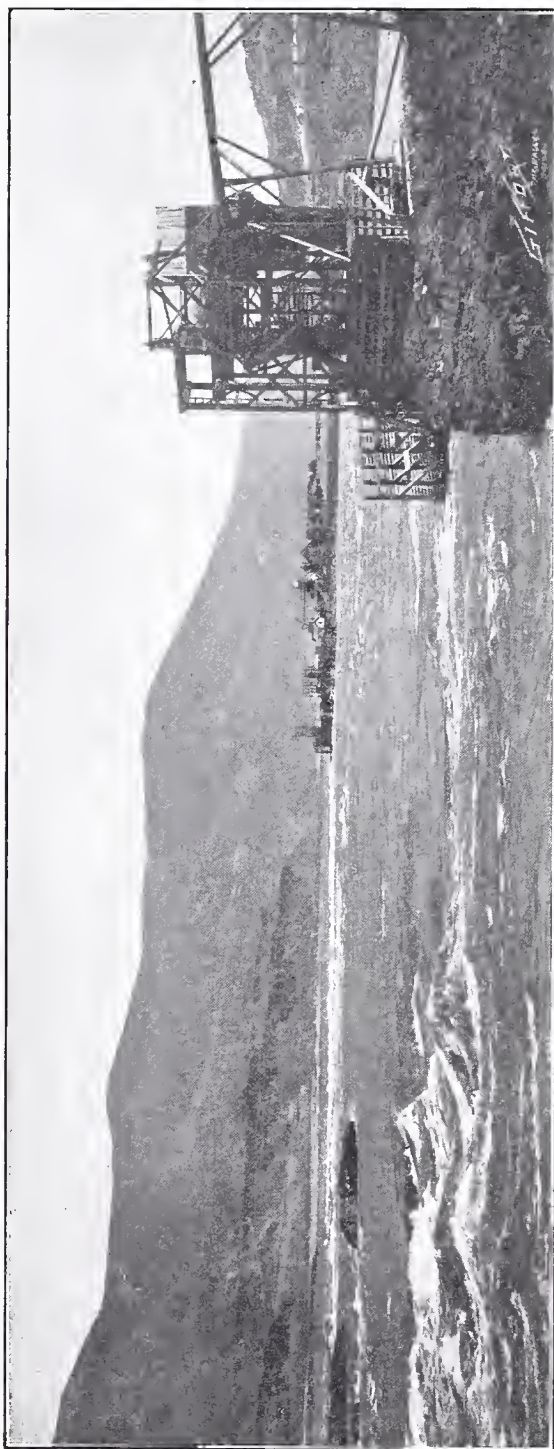
Fleet of Gill-Net Fishing Boats on the Lower Columbia Waiting for a Favorable Tide Before Beginning to Fish.



Fishing for Salmon With a Trap on the Lower Columbia River.



Seining for Salmon.



Fish Wheel on Upper Columbia River.

LETTER OF TRANSMITTAL.

PORTLAND, OREGON, December 31, 1912.

To the Honorable State Board of Fish and Game Commissioners
of the State of Oregon.

GENTLEMEN: Complying with the provisions of the law, I
hereby submit, for your consideration, the Annual Report of the
Department of Fisheries for the year 1912.

Respectfully,

R. E. CLANTON,
Master Fish Warden.

REPORT MASTER FISH WARDEN, 1912.

REPORT.

GENERAL.

The output of our fisheries for the year just passing, while falling below that of the previous season, which was the banner year in the history of the enterprise, was of sufficient importance to be classed well up among Oregon's many wealth producing industries. By a conservative estimate, I find that the salmon product taken from the Columbia and the other fish producing streams of the State approximated the value of \$4,000,000.

The reports furnished this department by those engaged in the business show that the canned product fell short about 40 per cent of its last year's mark. The amount of fish pickled, mild cured and sold fresh in the markets was, however, about 15 per cent greater. The falling off, therefore, in the entire industry was approximately 20 per cent.

The decrease in production in all lines was larger proportionately on the Columbia than on the coast streams. This was attributed to the fact that the fish entering the stream during the early part of the year were not as numerous as usual. For some unknown reason they lingered outside, near the mouth, and for the first time in the history of the industry, fishermen went out over the bar and caught them in large numbers by trolling in the ocean. About August 10th, however, the fish began coming into the river in great numbers and the catches indicated that the visible shortage in the pack was going to be greatly reduced. But late in July a great cloudburst occurred in Baker County and the water from it carried into the Columbia a great quantity of alkali sediment, which reached the lower Columbia shortly after the 10th of August and the progress of the fish into the stream was immediately stopped. This contamination lasted until the beginning of the Fall Closed Season, on August 25th, and immediately the delayed run started with the fish traveling in enormous numbers. This run continued up to and after the fall season opened; but, owing to the fact that the Chinook, by reason of being late, had deteriorated in quality and that there is small demand for the inferior grade of fish, only a few of the packing plants were operated.

During the season of 1911 there was a strong demand for all classes of the fall fish with the result that all of the packing plants along the river were in continuous operation. The fact that the packers did not use this late run of Chinooks does not indicate that

it means a great loss to the industry, for farther up the Columbia thousands of these fish were secured by the egg-taking plants for spawning purposes, and the rest went on upstream to spawn naturally. One of the results was that the egg stations secured the greatest quantity of spawn that has ever been taken.

On some of the coast streams the run of Chinook salmon was greater than in 1911, while on others it was less. On some of these streams the run of this variety of salmon was the greatest ever known and, taking all the streams together, the average production was about the same as that of the preceding season. In the catch of salmon of the Silverside variety, there was a noticeable shortage in all the coast streams, while the take of Chums was a least 50 per cent less than last year. The run of Steelheads to date indicates that the production from this specie will, should it continue as it started, make up to the fishermen the loss they sustained in the small catch of Silversides. The Steelheads come into the market at a time when other varieties of salmon are lacking and as they are very desirable in the fresh fish markets, they bring a better price there than any of the other varieties taken from these streams.

Taking in the fishing situation as a whole this past year, I see no reason for alarm, for while the value of the output was considerably less than last year, due to the fact that the canneries did not operate because of the low prices for the finished product, resulting in the catch being smaller, the amount of fish entering the stream was not far below that of last season. The value of the output was much greater during the past year than in any season except the one previous, for a number of years.

The run of this year, as well as last, convinces me that the results of the artificial propagation methods of the last half dozen years are beginning to be shown, and this fact should encourage those engaged in the propagation work to redouble their efforts in the keeping up of the industry.

From the reports filed with this office by the canners, packers, dealers and others dealing in salmon and sturgeon in the State of Oregon and on the Columbia River, the following table shows the amount of the entire product, in pounds, handled in a commercial manner during the past year, to say nothing of the fish consumed in a domestic way:

Specie.	Columbia River.		Coast Streams.	Totals.
	Oregon	Washington		
Chinook.....	15,874,247	6,355,577	3,603,360	25,833,184
Blueback.....	660,789	73,440	.....	734,229
Steelhead.....	1,804,145	899,070	54,966	2,758,181
Silverside.....	1,884,026	2,007,199	5,043,859	8,935,084
Chum.....	688,535	910,635	631,495	2,230,665
Sturgeon.....	852,080	18,554	1,951	872,585
Totals.....	21,763,822	10,264,475	9,335,631	41,363,928

LAW ENFORCEMENT.

The small number of violations of the fish laws during 1912, compared with those of former years, makes it evident that the commercial fishermen are beginning to look with more respect on the laws for the protection of the salmon. They are beginning to wake up to the fact that these laws were enacted for the express purpose of perpetuating the industry from which they gain their living, and that they are more directly and more materially benefited than anyone else by the state's effort to protect the fish. The fact that the fishermen are showing a better disposition to observe the laws is very gratifying to those of us who are charged with the enforcement thereof, for we have to look back but a few years to the time when these laws were held in utter contempt by a majority of the fishermen, and the one who could commit the most violations without being caught was counted quite a hero by many of his fellow fishermen. It is pleasant to know that these conditions no longer prevail, and that the law-breaking sentiment is rapidly on the wane. I feel justified in making the assertion that fully 90 per cent of those who follow the occupation are now law-abiding citizens.

While this department has, perhaps, been more aggressive than formerly, having kept more deputies employed during the closed seasons than in past years, a large part of the credit for the betterment of conditions is unquestionably due to other causes, chiefly the educational attitude of the press. Many of the newspapers have taken up the matter of law enforcement, pointing out to the fishermen that the laws are designed solely for the purpose of keeping the streams from becoming depleted of fish, and that they are only conserving their own best interests by observing these laws in every particular. This has, I believe, done more to create a favorable sentiment for the observance of the statutes than any other one thing.

Although the sentiment for law enforcement amongst the fishermen is almost entirely due to an enlightened understanding of the purposes and effects of the laws, there are a few who are withheld from violating the laws only by the fear of apprehension, with its consequent penalties, of which the confiscation and sale of their gear is mostly dreaded. It was the practice formerly for the courts to impose merely a nominal fine, generally \$50.00, and allow the offenders to go free with their boats and equipment, but the Board's policy now is to confiscate and sell all boats and gear taken in the practice of illegal fishing. Law breaking fishermen used to make joint agreements that if any one of their number should be arrested and fined each would contribute his share of the fine. In this way, because the fine fell lightly on each man in the pool and because the deputy wardens were unable to catch more than one or two parties to such an agreement, the others escaping with their catch, the business of breaking the law could be carried on profitably and

with little risk of loss, but when each individual law-breaker is liable to lose his boat and equipment, representing an investment of from \$800.00 to \$1,500.00, it is found more profitable to obey the law than to break it under risk of so material a loss.

Taught by our experience of previous seasons, the opening of the 1912 Spring Closed Season found us fully prepared to prevent violations and apprehend violators of the law. Because our regular patrol boats, the Launch Astoria and Oregon Patrol, are so well known to the fishermen by sight and by familiarity with the sound of their exhausts, that the boats themselves give sufficient warning to law-breakers of their approach, we found it necessary to secure a number of ordinary fishing boats for patrol purposes. Not only is it impossible for fishermen to detect these boats from those of other fishermen, but it is possible by their use for our deputies to follow into any water entered by the fishing boats, where the Launch Astoria and Oregon Patrol, by reason of their greater draught, could not go. These extra boats were placed in charge of Chief Deputy Warden Rathbun and Deputy Warden Gor, with instructions to maintain a thorough patrol and keep a diligent lookout. Additional men were employed to patrol the Willamette River and watch the fishway near the Falls. Despite these precautions more fish were found on sale in the Portland markets than we considered could have been taken legally, with hook and line. The dealers claimed that all the fish they bought had been taken legally. However, one Portland wholesale dealer was arrested in the act of receiving from two fishermen fish that had been taken with nets, all of whom were convicted in the Justice Court, the dealer being fined \$300.00 and the fishermen \$150.00 each, with a warning by the court that a repetition of the offense would mean an even more drastic sentence, including imprisonment. Both before and after this occurrence we kept watch of the hook and line fishermen, so that we knew approximately the amount of their catch, and I believe that but few fish caught illegally were afterwards offered for sale.

Our experience was that there was very little illegal fishing on the Columbia, the practice for the most part being confined to the upper Willamette. The reason for this condition was probably due to a ruling of a Clackamas County court against an order of the ex-Board of Fish Commissioners in providing an additional Spring Closed Season period on the Willamette River. Section 5239 of Lord's Oregon Laws makes a provision for a Spring Closed Season period on the Willamette River north of the Falls at Oregon City, from March 15th, noon, to April 15th, noon, but Section 5316 of the above code gives the Board statutory powers to provide additional closed season periods; and, in accordance therewith, passed an order closing the Willamette River from March 1st, noon, to May 1st, noon. The fishermen, believing that they could disregard the order of the Board with impunity and openly boasting that they could not be convicted of the violation thereof in a Clackamas County court,

these Willamette fishermen proceeded to ply their calling in defiance of the order. However, in the spring of 1911, a force of deputies was sent to the Willamette sufficient to almost completely discourage any attempt at illegal fishing and no open attempt was made. The boast that a conviction could not be secured in a Clackamas County court for violation of the Board's order was dispelled in the spring of 1912, when two fishermen were arrested and convicted and their boats and nets sold after a trial in a local court.

During the Fall Closed Season on the Columbia River, the patrol boats Launch Astoria and Oregon Patrol were not used for reasons already given. Fishing boats were hired entirely by the deputies, with such satisfactory results that, while an occasional net was taken, the law was well observed. The most important seizures were one trap and four gasoline boats, with nets and otherwise fully equipped. Upon the conviction of the owners thereof, the trap, boats and gear were sold, the trap bringing \$1,000.00.

The change in sentiment regarding the enforcement of the fish laws cannot be better illustrated than in the fact that signed letters are now received by this department from fishermen telling of the violation of the law by other fishermen, advising us when and where the violators may be apprehended. Heretofore there was a compact silence amongst all the fishermen, and the few letters that were received conveying information of violations were merely written out of personal malice rather than a desire to see the law enforced, and were seldom signed.

There has been very little violation of the closed season laws on the coast streams during the past year. Most of the violations detected by the deputies have been in cases where the fishermen would stretch their nets more than the legal distance across the streams. In other instances fishermen would encroach above the legal dead lines. The greater per cent of the fishermen on the coast streams, however, as on the Columbia River, are not inclined to disregard the law and have given information freely to the deputies, in cases of violation, and have been of great assistance in effecting strict observance of the laws.

The amount of license fees collected from canners, packers, dealers and fishermen, on packing establishments, fishing appliances, etc., in District No. 1, during the past year totalled \$22,481.00. In addition thereto there were 22 arrests for violations as a result of which an aggregate of \$745.47 was collected in fines, and \$1,840.82 received from the sale of confiscated fish and gear, and \$55.00 were received from the sale of unused property, making the total receipts for this district \$25,122.29. In District No. 2, embracing the coast streams, the total amount of license fees collected from canners, packers, dealers and fishermen was \$13,287.86. There were nineteen arrests made in this district for violations of fishing regulations, as a result of which \$845.07 were collected in fines; \$198.66 were realized from the sale of confiscated fish and gear, and \$41.10 witness

fees were turned in by the Master Fish Warden, making the total receipts for this district \$14,372.69, and a total for the entire state of \$39,494.98. It will be noticed that there is a substantial gain in the license receipts over those of the previous year. This is due to the fact that the fee for the licenses required by the canners, packers and dealers is based upon the amount of salmon and other anadromous fish and sturgeon handled during the previous season, which was the greatest for a number of years.

DISTRICT No. "1."

TABLE.

Showing the Chinook, Silverside, Steelhead and Blueback product of the Oregon side of the Columbia River, from 1901 to 1912, both inclusive.

Year.	Chinooks, Number of Pounds.	Silversides, Number of Pounds.	Steelheads, Number of Pounds.	Bluebacks, Number of Pounds.	Total Number of Pounds.
1901.....	13,381,318	1,284,526	1,792,033	267,558	16,725,435
1902.....	16,528,217	996,647	2,761,761	889,243	21,175,868
1903.....	20,601,939	1,007,444	2,666,375	299,470	24,575,228
1904.....	19,614,174	1,558,375	1,772,075	521,699	23,466,323
1905.....	20,768,977	478,119	2,797,218	380,977	24,425,291
1906.....	19,010,120	1,722,180	1,553,400	623,000	22,908,700
1907.....	15,798,116	1,045,516	1,112,009	196,102	18,151,743
1908.....	14,447,797	1,033,185	2,588,773	393,791	18,463,546
1909.....	12,473,731	1,426,677	2,153,155	1,551,434	17,604,997
1910.....	12,624,224	1,677,682	2,240,977	777,968	17,320,851
1911.....	21,937,174	913,558	1,611,721	457,681	24,920,134
1912.....	15,874,247	1,884,026	1,804,145	660,789	20,223,207

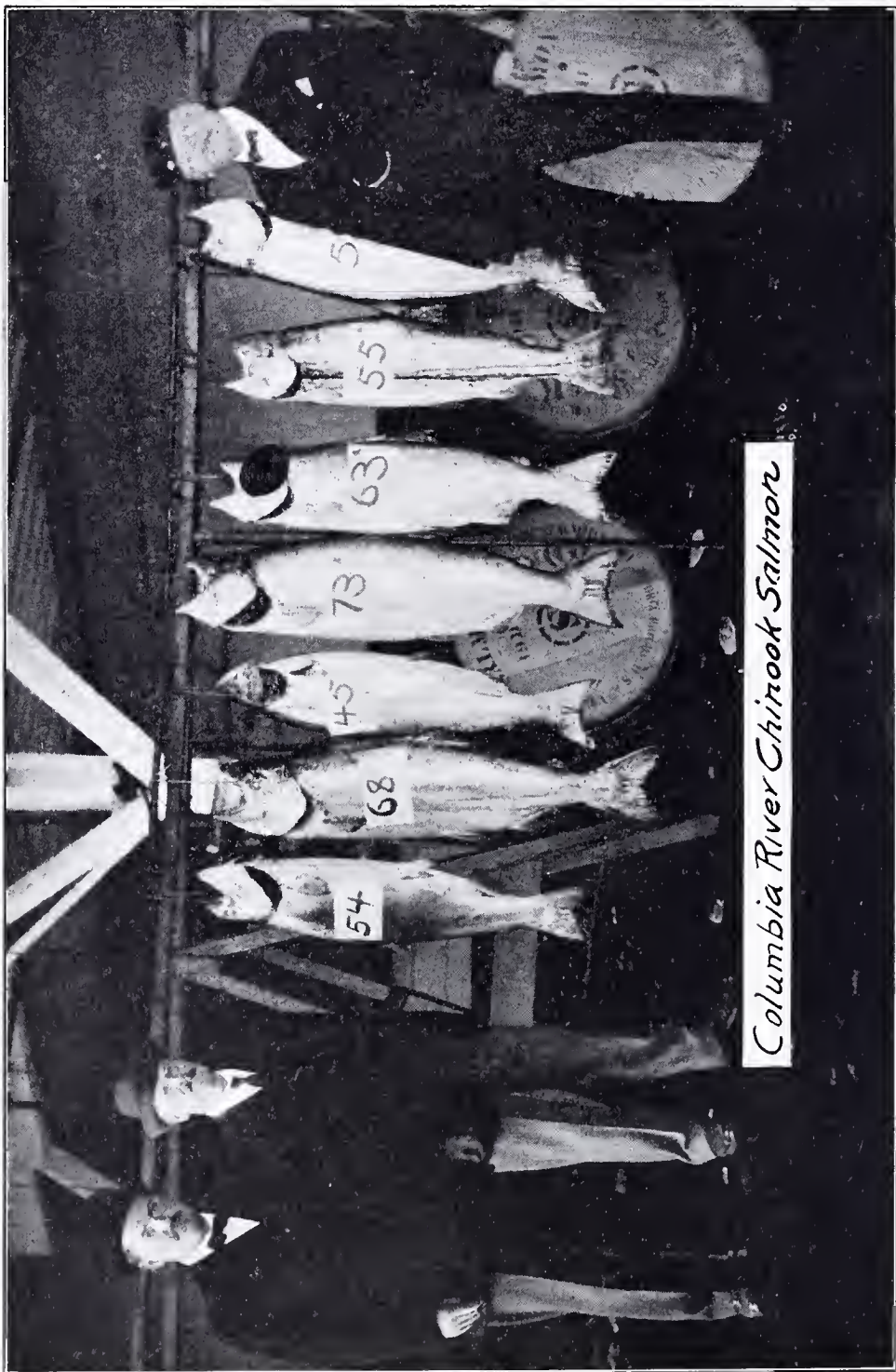
From the above it will be seen that the Chinook pack this year shows a falling off of 6,062,927 pounds from last year's pack, while the Silversides show an increase of 970,468 pounds, the Steelheads 192,424 pounds, and the Bluebacks 203,108 pounds.

As noted, the foregoing table merely shows the salmon product handled by the different canners, packers and dealers on the Oregon side of the Columbia River and its tributaries, but through the courtesy of the canners and packers on the Washington side of the Columbia River I have also been able to gather statistics showing the entire pack of the Columbia River and its tributaries during the past year, as will be seen by the following:

TABLE.

Showing the entire product of the Columbia River (Oregon and Washington) in pounds for the year 1912:

Specie of Fish.	Oregon.	Washington.	Total.
Chinook salmon.....	15,874,247	6,355,577	22,229,824
Blueback salmon.....	660,789	73,440	734,229
Steelhead salmon.....	1,804,145	899,070	2,703,215
Silverside salmon.....	1,884,026	2,007,199	3,891,225
Chum salmon.....	688,535	910,635	1,599,170
Sturgeon.....	852,080	18,554	870,634
Totals.....	21,763,822	10,264,475	32,028,297



Columbia River Chinook Salmon

SPRING CHINOOK SALMON.

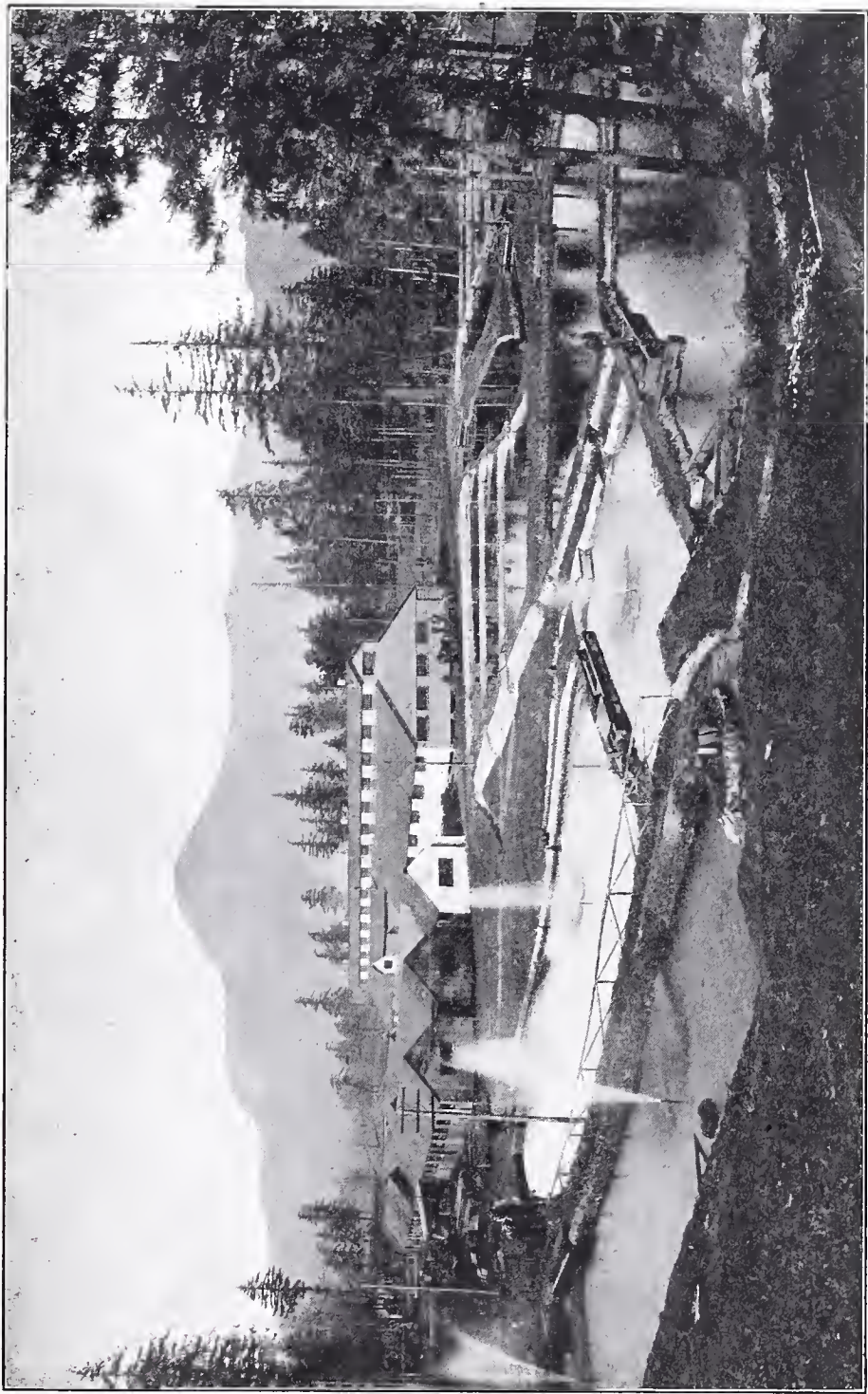
It is conceded that the early variety of Chinook salmon, which comes into the Columbia River during the spring season, is the most valuable, both in size and quality, from a commercial standpoint. It is also apparent that the annual supply of this variety is gradually diminishing and, in the interest of the fostering and perpetuation of this important asset to the fishing industry of the state, this department has been devoting most of its attention for several years to the securing of spawn of this specie of salmon. Our efforts in this direction have been more or less successful in past years but we have been seriously handicapped for many reasons, one of which is that the fish come into the Columbia River early in the year, and, in order to hold them, it is necessary to place racks across the tributaries early in the season. This exposes the racks to the danger of being washed out by the spring freshets and renders the chances of a successful take of eggs somewhat providential; and, in the event of a good supply of fish being stopped early in the spring, we are compelled to hold the fish throughout the summer. Owing to the construction of dams in connection with irrigation projects on the streams east of the Cascade Mountains, the spawning grounds on the upper tributaries of the Columbia in this state have been practically destroyed, and we are, therefore, forced to confine most of our efforts toward the securing of this species of salmon spawn to the Willamette River and its tributaries. A large percentage of the early Chinooks, which come up the Columbia River, enter the Willamette River. The first serious obstacle which they encounter to impede their progress to the upper stretches of the river is the Falls at Oregon City. Although some substantial improvements have been made to the fishway over this obstruction, the fish are still greatly retarded in their journey up the stream and, should they not be able to get over before the season opens and drift back below the dead line below the Falls, which affords very little protection on account of being too closely drawn, they are at the mercy of the fishermen's nets. Having surmounted the Falls, they proceed on their way up the river and, in order to hold them successfully at the hatcheries to secure the spawn, it has been thought best to go to the upper stretches of the Willamette where the tributaries are smaller and less difficult to control. Inasmuch as the racks must be placed in these tributaries early in the season in order to head off the vanguard of this early run of salmon, they are exposed to the risk of early spring freshets, which either flood or damage them and often permit the fish to escape. On the other hand, the effectiveness of the upper racks depends upon the stage of the river. If the water is low during the early summer months, all of the fish do not reach the racks and spawn upon the bars below, as was demonstrated by investigations conducted during the summer of 1911, when large numbers of salmon were

observed spawning on the riffles for several miles below the racks.

The racks, which were placed at the mouth of the McKenzie in accordance with the instructions of your body did not prove a success for the reason that they were partially carried away by the extraordinary high water in the Willamette and McKenzie Rivers. Since, as stated above, it is necessary to hold the strongest and best of this variety of salmon in order to perpetuate the specie in commercial quantities, and, while no means have as yet been devised to insure an absolute certainty that we will get the eggs, the most feasible plan of operation which I would suggest would be to establish racks lower down on the river to stop all of the fish, and, at the same time, place racks above so that, in the event of the lower racks being carried away by floods, the greater part of the fish will be arrested and held by the upper racks. In addition thereto, the early run of fish which may have passed the lower racks before same can be put in place, would be held by the upper racks. The Board is aware of the fact that the cost of preparing for the taking of the spawn from the earlier variety of salmon is greater than that of the later Fall varieties, because of the greater hazards involved in the former and the necessity for stronger and more expensive equipment, as against the less expensive racks required for fall operations, which are placed in the stream after the flood season is passed; but, inasmuch as the preservation of the salmon industry of the Columbia River depends largely upon the extensive propagation of this superior quality of fish, and those most vitally concerned in the perpetuation of the salmon industry on the Columbia River from a commercial viewpoint strongly advocate and urge the concentration of our efforts toward the propagation of this specie of Chinook, I am convinced that the additional expense is justified if the results can be obtained. The question of whether the spawn of spring salmon will propagate spring salmon is a mooted one, and one which cannot be satisfactorily settled without prolonged and systematic experimentation. The fact remains, however, that for some reason the salmon are coming in the Columbia River later every year, which is considered by some to be due to the propagation of the later run, or fall salmon, but whether or not this is true is not within my province or knowledge to say.

HATCHERY OPERATIONS.

Notwithstanding the fact that we were somewhat handicapped by a severe snowstorm, followed by high water, which affected our operations at the Bonneville Central Hatchery during the early part of the year, and the excessive floods which occurred on the coast streams during the latter part of the previous egg taking period which curtailed the take of Silverside spawn, I am pleased to report that this branch of the service has made a very creditable



Rear view of the Bonneville Central Hatchery, the largest plant of its kind in the world.

showing. There were liberated from the different state hatcheries 30,000,000 salmon fry, and, in addition to the young salmon planted in the various salmon streams, over 4,500,000 trout fry were propagated and turned over to the Game Department for distribution.

The output of salmon fry not only shows a material increase in numbers over that of last season but a much larger per cent of the young fish were held and fed for longer periods, thereby making the young salmon average very much larger in size when they were turned out to shift for themselves. That we were able to retain and feed the fry longer than during the previous season was due to the fact that additional nursery ponds had been constructed during the early part of the season at all of the stations where hatchery operations were to be carried on.

The results obtained from our hatchery operations during the past year has proven beyond a question of doubt that the policy adopted by your body, to hold and care for all the fry possible until they attain the size of from three to five inches in length, is the only right and sensible plan to pursue. That millions of fry can be successfully reared until they are of sufficient size to dodge their natural enemies while journeying to the ocean, if only proper care and attention is given them, is now a demonstrated fact. While the cost of carrying on artificial propagation under this new system is double that of the old method, when it was the practice to turn the tiny, helpless creatures out to shift for themselves as soon as the yolk-sac was absorbed, the larger per cent that will live under the present system to eventually return to their native streams and swell the output of our fisheries more than justifies the increased outlay.

The fishermen and packers who are taxed by license to provide the greater portion of the fund used to maintain the hatcheries, are now almost unanimously supporting and aiding the department in every way possible to carry on this work. This new and deeper interest that is being manifested by these people, who are most vitally interested in the perpetuation of the industry, has unquestionably been brought about by the improved and more sensible methods of propagation that are being employed by the Board in its efforts to place artificial work upon a more practical basis.

From every salmon producing stream we hear expressions of approval of the policy of the Board in the holding and feeding of the fry, and it is freely predicted that, if this good work is kept up it will be only a matter of a very few years until our streams will be again teeming with the silvery hordes of the best food fish in the world.

DISTRICT No. "1."**BONNEVILLE CENTRAL HATCHERY.**

According to the report of the superintendent in charge, which gives a detailed account of the operations carried on at this plant, there were on hand at the beginning of the year 11,624,000 Chinook fry and 1,983,700 Blueback (sockeye) fry; making a total of 13,625,700 fry of these two species of salmon. There was also a large number of trout fry and eggs, a detailed account of which is hereinafter given. All of the fry were in the finest condition at the beginning of the year and the indications for a successful season were most promising. Shortly afterwards, however, we were visited by the most severe snowstorm known for years. Snow fell for 30 hours continuously, attaining a depth of five feet on the level, and the storm continued in force for five days. While we were prepared for snow, in a measure, we were not fully prepared for a storm of such unusual severity; and, while operations were interfered with and a loss was experienced, considering the extraordinary conditions with which we had to contend, the situation was met with a fair degree of success and the loss of fry was not as great as it might have been. The most serious condition with which we had to combat in this emergency, was to prevent the smothering of the young fry in the ponds by snow which drifted therein in such quantities and formed a slush, which required continuous activity to prevent them from freezing solid. Another danger which was a serious menace to the young fish and the hatchery equipment was caused by immense slides of snow and ice which came down from the mountains into Tanner Creek, forming slush ice which drifted against the head gates of the pipe line and flume, by which the water is diverted to the hatchery, threatening to cut off the water supply. It also required constant work on the part of the crew to keep the pipes from freezing in the hatchery and the stirring of the younger fry in the troughs to keep them from smothering by snow which came in through the pipes. After the storm conditions has been met the melting of the snow caused a flood in Tanner Creek, which resulted in an overflow of water at the head gate of the flume, bringing down ice and causing an overflow of the flume. This overflow flooded the ponds and took out a portion of the embankment, causing some loss of fry and washing others down into Tanner Creek. In spite of all efforts to save the fry, a survey made by Chief Fish Culturist Wilson and Superintendent Greenman, in charge of the plant, placed the total loss of young salmon fry at 628,500. After the water receded and conditions changed to normal once more, the retaining ponds, all of which were slightly damaged were put in good condition again. With the seven new ponds which were completed, as well as a number of additional ponds which were

established under the hill in the slough adjacent to Tanner Creek, and the three ponds constructed by damming one of the main channels of Tanner Creek, we were enabled to hold a larger number of fry and with a better degree of success than previously. The fish were held and fed in these ponds and liberated as follows:

Chinooks.—Deducting the total loss of Chinook fry which was sustained from all causes, 720,000 since the first of the year, there were 4,500,000 liberated into Tanner Creek and thence into the Columbia River, between May 20th and 30th, by reason of the flood water of the Columbia backing up over the lower tier of ponds; 1,000,000 were liberated June 1st from the retaining ponds near the hatcheries, and 2,000,000 on July 20th from the upper ponds. Between July 23d and 31st, the balance of the Chinook fry, which, had been held over in the ponds, were liberated at different intervals, except 50,000, which were being held for marking purposes. During the latter part of August, after successfully marking 18,000 of these, the remainder escaped by water flooding the ponds in which they were being held.

Bluebacks.—Of the total amount of Bluebacks, 1,957,825, there was a total loss of 32,570. These fish were held in the large tanks near the hatchery and were liberated at different intervals during the month of August.

Silversides.—There was a total of 600,000 Silverside eggs received from the Tillamook Hatchery, where more were taken than could be properly cared for. During the period of incubation there was a loss of 12,500 of this specie; 11,600 were turned over to the Game Department to be planted in the various lakes, and the balance were held in the ponds until the first part of September, when they were liberated at different intervals during that month.

Notwithstanding the severe hardships that have been endured during the early part of the season, which crippled the service temporarily, the showing made for the season, as a whole, was very successful, as practically all of the young fry were held until they had attained from three to five inches in length, which was sufficient to protect themselves from their predatory enemies before being liberated, thanks to the foresight of your honorable Board in providing additional retaining ponds.

We have on hand at this date 20,949,230 salmon eggs and fry with which to begin the work for 1913, less the nominal loss. In addition, a large number of trout eggs are being received; also 108,000 Yank eggs from Wallowa Lake. Under the favorable weather conditions which we are now experiencing, the eggs and fry are all doing exceptionally well, and, as we now have 26 retaining ponds in which to hold and feed the fry when taken from the hatchery buildings, every indication points toward one of the most prosperous seasons we have ever experienced.

KLASKANINE RIVER HATCHERY.

The buildings have been completed and equipped, and the water supply turned in, everything was in readiness for the reception of eggs at this station on October 1st, last year. During that month there were received from the McKenzie and Wallowa Hatcheries and the Santiam Sub-station, an aggregate of 2,634,500 eyed eggs. of the early variety of Chinook salmon. The loss to these eggs and fry during the incubation period was 69,500, leaving 2,575,000 eggs and fry on hand at the beginning of the year. According to the report of Superintendent Hattan, there was a loss of 51,500 during the retention of the fry in the troughs and ponds. The remaining 2,522,500 fry were liberated from the new retaining ponds near the hatchery and ponds which were constructed in the creek, as follows:

May 1st to 10th liberated	300,000
June 4th liberated	700,000
June 24th to 29th	800,000
July 1st to 8th	400,000
August 7th to 14th	322,500

Although handicapped somewhat, being the first season the plant was in operation, an exceptional showing was made, as the fish which were transferred from the upper ponds to the creek ponds in May took on a phenomenal growth and were much larger at the time of liberation than any fish handled under similar conditions at the other hatcheries.

While the results obtained at this station during the fore part of the year were most satisfactory, the eggs being hatched and fry reared without experiencing any serious difficulty, a strange condition arose late this fall through which a quantity of newly hatched fry was lost, and, although every possible effort was exerted to discover the cause, the mystery remains in a measure unsolved at this date. So far as is known, the conditions at the beginning of operations this fall were identical to those of last year, if not more promising, and the outlook was most satisfactory. When the eggs began to hatch, however, the young fry began to die in large numbers and we were at a loss to account therefor. An analysis of the water was made, but not until after the fry had become infected, however, which yielded no impurities detrimental to the fish. The troughs were twice cleaned and thoroughly renovated, but the trouble occurred again. The best authorities on fish culture available were called in consultation upon the question and, although numerous theories were advanced in an effort to solve the difficulty, no definite solution has been arrived at as yet. Of the theories offered, the two most plausible were that the ash resulting from a fire at the head of the creek from which the water supply is obtained for the hatchery, combined with vegetable matter, imparted a poisonous substance to the water, or that the paint with which the troughs were treated contained some poisonous element. Since, we had indication of similar trouble at the Bonneville Station, subsequently, where the

troughs were treated with the same kind of paint, leads to the belief that the latter theory is the more nearly correct. The scourge finally abated, however, and the hatchery at this time is being operated under the most favorable auspices.

McKENZIE RIVER HATCHERY.

Owing to the widely fluctuating conditions of the McKenzie River from year to year, we have been working to a disadvantage, but, notwithstanding this handicap, we again were able to make a fairly good showing this year although racks were put in at the mouth of the river in order to get below the logging operations which were being carried on in the river, and as a means of holding the fish in the event of low water, more as a matter of precaution, we put the racks in above and near the hatchery during the latter part of April, as the material was already on the ground and the work could be performed at a nominal cost. This proved a wise move, for many of the fish had gone above the racks at the mouth of the river before the racks were put in and these fish were stopped by the upper racks until the June floods made a breach therein, allowing the fish to escape. However, this breach was repaired in time to hold the fish that had escaped from below the lower racks, which were also washed away by the floods. As a result of our efforts, a total of 2,217,275 eggs of the early variety of Chinook salmon were secured. Of this number, 58,275 were lost during the eyeing stage; 1,688,000 eggs were shipped to the Klaskanine River Hatchery and 466,000 eggs to the Bonneville Central Hatchery for incubation and care, leaving a balance of 5,000 eggs which were hatched and the resulting fry held at this station.

In order to continue our experiments in the endeavor to induce Steelhead salmon to come back to the McKenzie River after their migration to the sea, 206,000 eggs of this variety of salmon were received from the Tillamook Hatchery and hatched. The fry resulting therefrom were held in the nursery ponds and liberated in the creeks and tributaries of the McKenzie, between August 6th and 13th, in the vicinity of the hatchery. In addition thereto, 195,000 trout eggs of the Rainbow variety were taken at this station, hatched and turned over to the Game Department for distribution.

SALMON RIVER HATCHERY.

This station has not been operated since the fall of 1910, inasmuch as very few Chinook salmon succeeded in getting this far up the Sandy River, and the few eggs secured therefrom each year would not justify the expense. Early this spring, however, your body having decided to operate this station for Steelheads, a man was placed in charge, the plant placed in readiness for the work,

and the dam across the Sandy at the mouth of the Salmon repaired. Of this specie of fish we succeeded in securing 493,000 eggs. At this juncture it was discovered that quite a number of Chinook



View of the hatchery grounds and buildings at the Salmon River Hatchery.

salmon had put in an appearance below the dam end, and, upon being notified of this fact, the superintendent and crew being on the ground, I instructed the superintendent to prepare to take Chinook spawn, if there appeared to be a sufficient number of fish in evidence to justify the expense. As the work of taking Chinook eggs proceeded, we were agreeably surprised at the results obtained and the take of eggs proved a record-breaker over that of several years past, having secured 2,009,000 of the early variety and 417,550 spawn of the later run of Chinooks, making a total of 2,426,550 Chinook eggs for the station. The loss during the eyeing stage amounted to 358,750 eggs, leaving a balance of 2,067,800 eggs of both varieties. Of these 1,217,800 were shipped to the Klaskanine River Hatchery and 825,000 to the Bonneville Central Hatchery, and 25,000 eggs were sent to the State Fair at Salem and the Eastern Oregon District Fair at Pendleton, for exhibition purposes. I am unable to satisfactorily account for this unexpected run of Chinooks this season, but am inclined to think that the clearing away of the debris at the mouth of the river, thus diverting a part of the flow of the stream back into the old channel, which emptied into the Columbia River in a down stream direction, had something to do with it.

WALLOWA RIVER HATCHERY.

The Chinook salmon eggs which were taken at this station the previous fall were shipped to the Bonneville Central Hatchery for incubation. On account of the climatic conditions and the danger of the water supply freezing up at almost any time during the winter months, the expense of handling the eggs and fry at this point is much greater than at the Bonneville Central Station. The facilities at this latter plant are also far superior to that of Wallowa. Arrangements were made for the taking of Steelhead spawn this past spring, but, although we met with good success the previous spring with this variety of salmon, for some unknown reason the fish did not come up this year and the take was almost a failure. Superintendent Miller of this hatchery was, therefore, transferred to Olive Lake in June to collect trout spawn, Rainbow and Black Spotted being obtained, the greater portion of which were propagated at the Wallowa Station during the summer and turned over to the Game Department for distribution.

There was also a falling off of Chinook spawn at this plant during the fall season, only a small number of this variety of salmon having put in an appearance below the racks. Later on the Silversides came up in great numbers, and, although it was not the intention of the department to handle any spawn of this specie at this station this season, the superintendent in charge had succeeded in taking several million eggs before this office was advised of the fact, and, as the gathering of the spawn was done at a nominal expense, we allowed him to take 4,227,000 eggs, which are now being held in the hatchery. As the funds in District No. 1 are limited, I think it advisable to transfer the most of these eggs to the different coast hatcheries where the take of this variety of spawn was short this season, for incubation.

Also, for the purpose of carrying out the experiments as ordered by your body, 124,000 eggs of the Yank specie of fish were taken from Wallowa Lake and held at this station until they were eyed, when they were transferred to the Bonneville Central Hatchery for incubation and attention.

SANTIAM SUB-STATION.

During 1911 racks were placed across the north fork of the Santiam River, about one mile above Jefferson, when we succeeded in making a creditable showing with the early variety of Chinook salmon. This year we replaced the racks at the same point in the stream, but the logging operations which were carried on upon the south fork the previous season, were transferred to the north fork this year, which seriously interfered with our work and prevented our holding the fish in sufficient numbers. When the water cleared later on we found that not enough fish were held below the racks



Rack for stopping and holding salmon on the headwaters for spawning purposes.

to justify the expense of taking the spawn and the racks were removed. However, should it develop that no logging operations will be carried on upon this branch of the Santiam next summer, I think the racks should be replaced and spawning operations resumed.

WILLAMETTE RIVER RACKS.

Having experienced a great deal of trouble, due to a series of sudden and unprecedentedly severe floods on the Willamette and McKenzie Rivers, our operations on the former stream were not satisfactory the past season, as comparatively few eggs were taken at this sub-station, whereas, under normal conditions, we should have secured an enormous quantity of the early spring salmon. Having made an investigation along the upper stretches of the Willamette and McKenzie Rivers last season, and finding that a great number of fish were spawning on the bars below the racks, on account of the low stage of the water, we were convinced that, in order to insure a better take of spawn in the future, the racks should be placed farther down the streams. Accompanied by Superintendent Ryckman, of the McKenzie River Hatchery, and Chief Fish Culturist Wilson, I made an investigation of the conditions along the Willamette River from Eugene to Harrisburg, and we concluded that the most practical point for the location of the racks across the Willamette was at the mouth of the McKenzie River. This was thought advisable because, by turning the fish into the McKenzie, where the temperature of the water rarely, if ever, registers very high, we would have better success in holding the fish. Having presented our conclusions to your body at the November meeting and received instructions to proceed with the work, arrangements were made for the material during the early part of this year and Mr. C. B. Ryckman was engaged to install the racks. Our first plan was to rack the Willamette to turn the fish up the McKenzie and install racks about 12 miles up the latter stream, where a desirable location had been selected. It developed, however, that preparations were under way to carry on logging operations on the McKenzie, which would interfere with our work, and it, therefore, became necessary to install the racks down below where the logs were being diverted from the McKenzie River. The only place where the racks could be established and the fish successfully held was near the mouth of the river. The material was on the ground and the racks were completed May 20th. Within a short time the fish began to put in an appearance, but the racks on the Willamette River were carried away on May 29th, and thousands of fish escaped up that stream. The flood came so suddenly and so mightily, having reached a stage of nine feet within 24 hours, that it carried huge trees and other large drift down the river, sweeping everything before it. The racks on the McKenzie went out a few days

later. As soon as the water receded the racks were replaced and a large number of fish again appeared, but another heavy freshet occurred in the Willamette on June 15th, damaging the racks to such an extent that a great number of fish escaped up that stream. The later run of fish were stopped, and while there was evidence of a great number of fish in the big hole in the Willamette, near the mouth of the McKenzie, early in September a freshet occurred in the McKenzie, causing a hole in the rack and allowing the fish to escape up the McKenzie River, some of which reached the racks which had been installed across the stream at the hatchery where the fish were spawned. The records show that the water was higher during these freshets than it has been for a number of years previous. Had the conditions been more favorable and had we succeeded in holding the lower racks, I am confident, from the reports received from the men in charge of the station, that an enormous quantity of early spring eggs would have been taken. I would respectfully recommend that the rack across the Willamette at the mouth of the McKenzie River be installed as early as possible, and that, instead of the racks in the McKenzie being placed at the mouth as formerly, they be installed about 12 miles up, near Walterville, which is a very desirable location, and, I understand, logging operations will not be carried on this year.

SUMMARY OF HATCHERY OPERATIONS, COLUMBIA RIVER.

FRY LIBERATED.

From the table herein submitted, it will be noticed that 13,261,735 Chinook, 955,660 Silverside, 1,957,825 Sockeye and 518,500 Steelhead fry were liberated into the Columbia River and its tributaries by this department during the year 1912; making a total of 16,693,720 fry.

TABLE.

Showing the number of fry liberated into the Columbia River and its tributaries during the year 1912 by the State of Oregon:

Station.	Chinook.	Silverside.	Sockeye.	Steelhead.	Where Planted.
Bonneville.....	10,599,490	578,005	1,957,825	518,500	Tanner Creek. Klaskanine.
Klaskanine.....	2,522,500	377,655	.....	.....
McKenzie.....	139,745	.....	.....	.....
Totals.....	13,261,735	955,660	1,957,825	518,500	

SPAWN SECURED.

Although handicapped by extreme freshets during the spawn taking season, the department succeeded in taking 5,027,275 eggs from the early variety of Chinook salmon, 417,550 from the late Chinooks, 4,227,000 from the Silversides and 124,000 from the Yanks; making a total of 9,795,825 eggs from all species of fish, as will be seen in the following:

TABLE.

Showing the number of eggs secured from the different species of salmon at the hatcheries operated by the State of Oregon tributary to the Columbia River, during the year 1912:

Station.	Early Chinooks.	Late Chinooks.	Silversides.	Yanks.	Totals.
Salmon River.....	2,009,000	417,550	.....	.....	2,426,550
Willamette.....	169,000	.....	.....	.....	169,000
Wallowa.....	64,500	.....	4,227,000	124,000	4,415,500
Bonneville.....	.....	567,500	.....	.....	567,500
McKenzie.....	2,217,275	.....	.....	.....	2,217,275
Totals.....	4,459,775	985,050	4,227,000	124,000	9,795,825

DISTRICT No. "2."

SALMON INDUSTRY.

From reports furnished me by the canners, packers, dealers and others engaged in the handling of salmon in a commercial manner in Fishing District No. "2", which embraces all of the streams in the State of Oregon flowing into the Pacific Ocean south of the Columbia River, find that the following amounts of the different species of salmon were handled:

Chinook.....	3,603,360 pounds.
Silverside.....	5,043,859 pounds.
Steelhead.....	54,966 pounds.
Chum.....	631,495 pounds.

These figures, like the statement for District No. "1," do not include the amount of this product consumed by private individuals, statistics of which are unobtainable although it is considerable. However, the foregoing will give a person a general idea as to the magnitude of the industry.

TABLE.

Showing the salmon product of the streams in the State of Oregon flowing into the Pacific Ocean south of the Columbia River for the years from 1901 to 1912, both inclusive:

Year.	Chinook, Number of Pounds.	Silverside, Number of Pounds.	Steelhead, Number of Pounds.	Chum, Number of Pounds.	Total Number of Pounds.
1901.....	689,338	2,990,462	76,999	614,819	4,371,618
1902.....	751,123	2,068,760	26,060	556,860	3,402,803
1903.....	1,254,927	2,830,272	46,426	418,060	4,549,685
1904.....	1,668,000	3,316,004	232,100	683,400	5,899,540
1905.....	2,139,085	2,273,465	376,016	767,162	5,555,728
1906.....	2,018,980	4,721,000	67,000	236,710	7,043,690
1907.....	2,018,643	3,852,112	210,520	657,407	6,738,682
1908.....	1,049,864	4,660,937	298,802	412,908	6,422,511
1909.....	1,247,917	3,328,209	79,549	826,733	5,482,408
1910.....	2,445,874	5,426,261	151,414	342,107	8,365,656
1911.....	3,096,286	7,130,833	46,067	595,241	10,868,427
1912.....	3,603,360	5,043,859	54,966	631,495	9,333,680

It will be seen from the foregoing that the Chinook pack this past year exceeded the Chinook pack of 1911 by 507,074 pounds, the Steelhead pack shows an increase of 8,899 pounds and the Chum pack 36,254 pounds, while the Silverside product shows a falling off of 2,086,974 pounds.

FISHING APPLIANCES, CANNERIES, ETC., OPERATED AND LICENSE FEES PAID.

	No.	Rate.	Amount.	Total.	Grand Total.
CLATSOP COUNTY—Necanicum River—					
Gill-net.....	1	\$5.00	\$ 5.00		
Set-nets.....	26	2.50	65.00		
Seines.....	2	.....	30.00		
Dealers.....	4	.....	35.00	\$ 140.00	
Elk Creek—					
Set-nets.....	3	2.50	\$ 7.50	\$ 7.50	\$ 147.50
TILLAMOOK COUNTY—Tillamook Bay—					
Gill-nets.....	81	5 00	\$405.00		
Set-nets.....	358	2.50	895.00		
Seines.....	8	.....	123.00		
Canners.....	2	.....	550.00		
Cold Storages.....	3	.....	265.00		
Fish dealers.....	31	.....	190.00	\$2,428.00	
Nehalem River—					
Gill-nets.....	50	5.00	\$250.00		
Set-nets.....	293	2.50	782.50		
Canners.....	2	.....	500.00		
Cold storages.....	1	.....	10.00		
Dealers.....	1	.....	5.00	1,547.50	
Nestucca River—					
Gill-nets.....	30	5.00	\$150.00		
Set-nets.....	118	2.50	295.00		
Canners.....	1	.....	200.00		
Cold storage.....	1	.....	10.00		
Dealers.....	33	.....	170.00	825.00	
Slab Creek—					
Set-net.....	1	2.50	\$ 2.50	2.50	4,803.00

FISHING APPLIANCES, CANNERIES, ETC., OPERATED AND LICENSE FEES PAID.—Continued.

	No.	Rate.	Amount.	Total.	Grand Total.
LINCOLN COUNTY—Salmon River—					
Gill-nets.....	2	5.00	\$ 10.00		
Set-nets.....	13	2.50	32.50		
Dealers.....	2		32.50	\$ 75.00	
Siletz River—					
Gill-nets.....	27	5.00	\$135.00		
Set-nets.....	95	2.50	237.50		
Canners.....	1		200.00		
Cold storages.....	1		60.00		
Dealers.....	4		20.00	652.50	
Yaquina Bay—					
Gill-nets.....	48	5.00	\$240.00		
Set-nets.....	12	2.50	30.00		
Dealers and Jobbers.....	31		220.00	490.00	
Yachats River—					
Set-net.....	1	2.50	\$ 2.50	2.50	
Beaver Creek—					
Set-net.....	3	2.50	\$ 7.50	7.50	
Alsea Bay—					
Gill-nets.....	82	5.00	\$410.00		
Set-nets.....	214	2.50	535.00		
Canners.....	2		250.00		
Cold storages.....	2		100.00		
Dealers.....	2		10.00	1,305.00	2,532.50
LANE COUNTY—Siuslaw River—					
Gill-nets.....	61	5.00	\$305.00		
Set-nets.....	245	2.50	612.50		
Seine.....	1		27.00		
Canners.....	2		300.00		
Cold storages.....	2		30.00		
Dealers.....	19		102.50	\$1,377.00	1,377.00
DOUGLAS COUNTY—Umpqua River—					
Gill-nets.....	63	5.00	\$315.00		
Set-nets.....	285	2.50	712.50		
Canners.....	2		400.00		
Cold storages.....	2		77.50		
Dealers.....	13		67.50	\$1,572.50	
Five Mile Creek—					
Set-net.....	1	2.50	\$ 2.50	2.50	1,575.00
COOS COUNTY—Ten Mile Lake—					
Set-nets.....	5	2.50	\$ 12.50	\$ 12.50	
Coos Bay—					
Gill-nets.....	83	5.00	\$415.00		
Set-nets.....	71	2.50	177.50		
Seine.....	1		21.00		
Canners.....	2		250.00		
Dealers and Jobbers.....	9		100.00	963.50	
Coquille River—					
Gill-nets.....	87	5.00	\$435.00		
Set-nets.....	136	2.50	340.00		
Seines.....	9		237.66		
Canners.....	2		350.00		
Dealers.....	15		75.00	1,437.66	
Four Mile Creek—					
Set-nets.....	2	2.50	\$ 5.00	5.00	
Two Mile Creek—					
Set-net.....	1	2.50	\$ 2.50	2.50	
New River—					
Gill-net.....	1	5.00	\$ 5.00		
Set-nets.....	3	2.50	7.50		
Seine.....	1		16.20	28.70	\$ 2,449.86

FISHING APPLIANCES, CANNERIES, ETC., OPERATED AND LICENSE FEES PAID.—Continued.

	No.	Rate.	Amount.	Total.	Grand Total.
CURRY COUNTY—Floras Creek—					
Gill-net.....	1	5.00	\$ 5.00		
Set-nets.....	4	2.50	10.00	\$ 15.00	
Sixes River—					
Set-nets.....	13	2.50	\$ 32.50	32.50	
Elk River—					
Set-net.....	1	2.50	\$ 2.50	2.50	
Pistol River—					
Seine.....	1		\$ 15.00	15.00	
Chetco River—					
Gill-nets.....	4	5.00	\$ 20.00		
Set-nets.....	5	2.50	12.50		
Seines.....	5		78.00		
Dealers.....	3		37.50	148.00	
Windchuck River—					
Seine.....	1		\$ 15.00	15.00	
Rogue River—					
Dealers.....	32		\$175.00	175.00	403.00
Total.....					\$13,287.86

HATCHERY OPERATIONS.

TILLAMOOK HATCHERY.

In keeping with the results almost invariably obtained at this hatchery, the operations of the past season were quite satisfactory and fully up to expectations. During the egg-taking seasons in the fall and winter of 1911, there were 738,000 Chinook, 2,940,000 Silverside and 3,767,000 Steelhead eggs taken, or an aggregate of 7,445,000 eggs of all varieties. The total loss of Chinook eggs and fry for the season was 91,700, leaving a balance of 646,300 eggs and fry of this specie of salmon. The loss to the Silversides was 361,869, and 1,000,000 Silverside eggs were shipped to the Bonneville and Klaskanine Hatcheries to make room for Steelheads, showing a residue of 1,578,131 Silverside eggs and fry. Of the 3,767,000 Steelhead eggs taken there was a loss of 822,300 eggs and fry during the incubation period, and 2,124,000 eggs were transferred to the other hatching stations where there were better facilities for the handling of same, leaving a balance of 820,700 of this variety, or an aggregate of 2,369,131 eggs and fry of all varieties which were hatched and held in the troughs and artificial and creek ponds at this station until March 8th. Between this date and March 20th, 221,000 fry were liberated in the Trask River; between April 8th and 20th,

425,300 fry were liberated in the same stream, and between May 7th and 30th, the balance, or 1,578,131, were also turned loose from the creek ponds into the stream. Owing to the overcrowded conditions at this hatchery and the inadequate water supply, we experienced a loss of 812,000 eggs during the eyeing stage and later on we lost 10,300 small fry. As it is not possible to take care of all the eggs taken at this hatchery under these conditions, we were obliged to ship out 2,124,000 Steelhead eggs to other hatcheries for incubation and care, and the remainder of this variety of spawn, or 820,700, was hatched at the station and held and fed in the creek ponds until they arrived at sufficient size to care for themselves, when, between August 7th and September 7th, they were liberated at different intervals in the Trask, Kelchis, Salmonberry and Nehalem rivers. While we are usually fortunate in making a favorable take of eggs at this station, we are seriously handicapped by a lack of sufficient water supply to take care of them properly and this necessitates the shipping of the portion of the eggs out each year to other stations. In this connection, I made a thorough investigation in order to ascertain if an additional supply of water could not be secured for this station, but I found that the cost of providing an adequate supply would be excessive and impracticable. While I have not made an investigation as yet, I am reliably informed that a good location for a hatchery exists on Wilson River, about three miles from the present location of the Trask Hatchery, where an abundance of water can be secured at a nominal expense. Since Tillamook Bay and its tributaries are of the most important waters on the coast south of the Columbia, in relation to the salmon industry, it is highly important that preparations be made for an increased output of the hatcheries in keeping with the scope of the fishing industry, and, if the conditions on Wilson River are found to be as favorable for the location of a hatchery as they are reported to be, I think it advisable to move the Trask Hatchery over to that stream but leave the racks in the Trask River to be operated in conjunction with the hatchery at the new location.

During the early fall months, the water in Trask River was again too low to allow the parent Chinook salmon to reach the stop rack in very large numbers, although we succeeded in securing 1,689,000 eggs. The run of Silversides is always later in the season, when the water conditions are more favorable, from which species we have succeeded in taking 453,000 eggs to date, with every indications for a good season.

With a view of doing everything possible to build up the Chinook product on this stream, 194,000 early Chinook salmon eggs were transferred to this station from the Government Hatchery on Rogue River, making a total of 2,336,000 eggs handled at this station this fall, with 2,196,695 eggs and fry still on hand at the last of the year, after deducting the loss of eggs and fry up to this time.

YAQUINA HATCHERY.

The past few years the run of Chinook salmon has not been so large in Elk Creek as in former years, which is probably accounted for by the fact that a crib, which was constructed at the mouth of the Big Elk, at its confluence with the Yaquina River, by a milling firm, turned the most of the fish up the latter stream. Then again, because of low water in Elk Creek, during the spawn-taking period, the fish were unable to reach the racks and the taking of eggs of the early run of Chinooks at this station was not altogether satisfactory, but, by catching the fish on the riffles below the hatchery while the tide was out, we succeeded in securing a total of 162,000 eggs of this variety of salmon. The total loss of eggs and fry of this species, during the incubation period was 13,008, leaving a balance of 148,992 fry on hand.

We were more successful in the taking of Silverside eggs, however, as the fall freshets enabled the fish to reach the racks where they were held and the spawn taken, resulting in a take of 1,701,000 eggs of this specie. The total loss of eggs and fry during the incubation period was 146,398, leaving a balance of 1,554,602. The aggregate of 1,703,592 fry of both varieties were held at the hatchery in the troughs and retaining ponds until April 11th and 12th, when 510,000 were transferred to Bear Creek, a small stream above the hatchery, where temporary retaining ponds had been formed by damming the stream, and Mr. Updyke, who owns the property upon which the ponds were located, was engaged at a nominal salary to feed and look after the fish. On May 5th, 317,190 more were liberated in Elk Creek below the hatchery, and on May 21st, all of the remainder of the young fry, 1,068,212, were transferred from the hatchery to the Bear Creek retaining ponds, where they were held and fed until August 1st, when the dams were removed and the fish were permitted to go at will down Bear Creek. Although these fish were fed on dried salmon, mixed with mush, the loss was only normal and the fish were in fine, healthy condition when released.

The take of Steelhead spawn was not satisfactory at this station this year for the reason, as given by the superintendent in charge, that the flooding of the creek allowed many of the fish to escape over the dam, and later on a number of sawlogs came down and jammed against the gate in the dam, breaking it away and permitting the fish to escape up the stream.

In order to increase the take of Chinook spawn for this station racks were placed across the Yaquina River about four miles above its confluence with Elk Creek, and the opinions entertained by the fishermen, that a great number of the Chinooks went up this branch of the stream, were borne out by the fact that a large number of fish were stopped by these racks. We had succeeded in securing

515,500 eggs when a flood occurred in the Yaquina on November 12th, the water rising to a height of eight feet over the dam, which allowed the balance of the fish to escape up stream. Had this misfortune not occurred it is estimated we had enough parent fish in sight to insure a take of at least 2,000,000 eggs. At the dam on Elk Creek, near the hatchery, we secured 302,500 Chinook eggs, giving us a total of 818,000 to be handled at this hatchery. The racks on the Yaquina were removed, for the reason that all of the Silverside eggs that could be handled could be secured at the dam and trap near the hatchery on Elk Creek. Of this specie we have taken to date, 2,254,000 eggs. While a larger number of eggs could have been taken, the parent fish still being in evidence below the racks, the amount of fry which will result from the eggs taken will be all that the hatchery will be capable of handling satisfactorily during the coming season and instructions were given to remove the obstructions and permit the fish to proceed to the natural spawning grounds. The Steelhead salmon have begun to put in an appearance below the racks and the indications for the taking of a large number of eggs of this specie of salmon are very promising during the coming spring. We are also in the midst of taking the spawn of Black Spotted trout, having, during the past two months, secured 1,100 adult trout of this variety, which are being held in the ponds and the spawn of which is now being taken. As the heavy runs of this specie of trout do not occur until the latter part of January, the prospects for a good take of trout eggs are very promising.

ALSEA RIVER HATCHERY.

As was the case with most of the other coast stations during the spawning season, the operations at this hatchery were greatly impaired by the early spring freshets which flooded the racks and permitted the Silversides that were being held to escape. Later on, another flood came and the Steelhead salmon, which were below the racks, escaped and no eggs of this variety were secured. Notwithstanding these difficulties, we were able to secure, during the fall and winter seasons, 328,000 Chinook and 1,410,000 Silverside eggs. The loss to the Chinook spawn, during the incubation period, was 40,250, and to the Silverside spawn, 411,050, leaving a balance of 1,286,700 eggs and fry of both varieties upon which to operate this season. A breakage in the flume and the cutting off of the water supply from the hatchery was responsible for the heavy loss to the Silverside eggs, which occurred during the early stages of incubation. The fry resulting from the above eggs were held and fed in the troughs and the four new retaining ponds, which had been established in an old creek channel near the hatchery, until May 4th. Between this date and May 15th a total of 687,750 young fry of the Chinook and Silverside variety were liberated in the stream,

and, between June 5th and 15th, the remainder of the Silversides, or 598,950, was also released. Although the breach in the dam, which had been made by the spring floods, had been repaired and the structure greatly strengthened throughout, an extraordinarily severe flood occurred on November 12th, and the drift which lodged against the racks carried out a section of the same and allowed all of the fish, which were being held at the time, to escape. Before this misfortune transpired, however, we were able to secure 471,000 Silverside eggs and 98,000 Chinook eggs. As it will be impossible to repair the damaged racks in this stream until next summer after the spring freshets of the coming year have subsided, we deemed it advisable and the superintendent in charge was instructed to transfer operations from this stream to Fall Creek, which empties into the Alsea River below the hatchery, where the indications, at this time, for a large take of Silverside eggs are most encouraging. As this tributary is also frequented by runs of Steelheads, the prospects are very favorable for a large take of spawn from this variety of salmon during the coming spring months.

SIUSLAW RIVER HATCHERY.

As we were again hampered by high water, the egg take of the previous fall at this station was not up to our expectations and we were obliged to ship in eggs from other stations. Four hundred six thousand eggs of the early variety of Chinooks were subsequently received from the Umpqua Hatchery, where we were more fortunate



View of the Siuslaw River Hatchery.

in taking eggs. We secured at this hatchery, in addition to the above, 335,000 Chinook eggs, and 547,500 Silverside eggs; making a total of 1,288,500 of all varieties of spawn. Later on we secured a total of 86,000 Steelhead eggs. The aggregate loss to eggs and fry of this number during the incubation period amounted to 80,544, leaving a net balance of 1,294,756 of all three varieties upon which to operate this season. These fry were held and fed in the troughs and nursery ponds at the station until March 1st, when 30,000 Chinooks were liberated; during the month of April 261,000 Chinooks and Silversides were turned loose in the stream; during the latter part of May 483,000 of these two varieties were liberated, and, from June 1st to 15th, the balance, or 447,121 fry, was released. During the month of July all of the remaining Steelheads, after the loss was deducted, or 73,635, were liberated. Because of the extensive logging operations which are carried on upon Lake Creek, upon which the hatchery and permanent racks are located, our take of eggs at this station each season is somewhat problematical. The racks which are maintained upon the Siuslaw River, to divert the fish into Lake Creek, is of a temporary nature and have to be repaired every spring before the run of salmon begins. The permanent racks on Lake Creek, four miles up from the mouth, are frequently taken out by the heavy log runs. Upon the completion of the new sawmills which are being established lower down on the Siuslaw in anticipation of the advent of the new railroad, logging operations upon Lake Creek will be considerably increased and work greater hardships upon the racks in their present location. I think it advisable, while maintaining the racks on Lake Creek in their present location, that racks be placed on Lake Creek at its confluence with Indian Creek, one of its main tributaries, so as to divert some of the fish up the latter stream, which should also be racked and operated in conjunction with the main hatchery racks. While the Lake Creek racks are provided with gates to permit of the passage of logs through the dam, which serve the purpose under normal conditions, when the logs are flushed down the stream in huge jams, they carry everything before them and the gates are of little avail. This fall we were able to secure 282,100 Chinook eggs and 634,800 Silverside eggs, with quite a number of parent fish of the latter variety still in evidence below the racks with which to begin our next year's operations.

UMPQUA RIVER HATCHERY.

The take of eggs of the early Chinook variety of salmon at this hatchery during the previous egg taking period amounted to 1,673,100; of these 300,000 were shipped to the Siuslaw Hatchery. The total loss of eggs and fry, during the incubation and retention period, aggregated 119,674, leaving a balance of 1,253,436 fry which were

being held in the ponds. From May 8th to 21st, upon different occasions, an aggregate of 750,000 fry were liberated in the Umpqua River. The remainder were held and fed in the retaining ponds until July 30th, when 300,000 were liberated into the Umpqua, and the balance were liberated in this stream on August 6th. These fry were first fed upon liver, but later were put upon a diet of dried salmon mixed with mush, and, although the pond capacity was not quite sufficient to properly care for this number of fish, the fry were in fairly good condition when turned out.

Having experienced the same trouble as upon the previous season, our racks having been damaged by freshets and allowing most of the adult fish to proceed up the stream, the take of eggs this (Fall) season only amounted to 1,463,200 Chinook eggs. A total of 144,222 eggs and fry were lost during the incubation period, leaving a balance of 1,318,978. Of these, 400,000 eggs were shipped to the Klaskanine River Hatchery which leaves us 918,978 fry and eggs on hand at the close of this report. Inasmuch as experience has taught us that, until an additional supply of water can be secured, this number of fish is about all that can be held and taken care of at this station, it was thought best to send the surplus to the Klaskanine River Hatchery for incubation and attention.

With the exception of the Rogue River, this is the only stream south of the Columbia River where the early run of Chinook salmon occurs, and it is necessary to place the racks in early in the season. In consequence of our trouble with freshets, which flooded our racks, the results obtained during the past two seasons at this station were not up to the standard of 1910, when approximately 7,000,000 eggs were secured. With the permission of your body, I would like to make an investigation of the conditions at the Winchester dam, in this stream, to ascertain if the fish cannot be held back there until the danger of spring freshets at the hatchery is over, when they can be permitted to proceed on up to the racks. If this plan is found feasible we will be assured of holding a sufficient number of parent fish for a take of 10,000,000 eggs at this hatchery.

SOUTH COOS RIVER HATCHERY.

On the whole, the results realized from the operations of this hatchery this past season have been highly satisfactory, which is principally due to the efficient management of Superintendent Frank W. Smith, who is in charge of this as well as the Coquille River Hatchery Station. As is shown by the previous report, there were 2,092,695 Chinook eggs and 2,399,000 Silverside eggs taken during the fall of 1911. There was a loss of 54,000 Chinook and 16,000 Silverside eggs during the incubation period, and 155,000 Chinook eggs were transferred to the Coquille Station, leaving a balance of 4,266,695 eggs and fry of both varieties on hand at the

station at the beginning of the year. The loss to Chinook eggs and fry between January 1st and May 1st of this year aggregated 90,425, and that, with the Silverside loss of 191,080, leaves 1,948,270 Chinooks and 2,191,920 Silversides, or an aggregate of 4,140,190 young fry of both varieties on hand at the hatchery on May 1st. These fish were held in the troughs and artificial nursery ponds at the station until May 10th, when they were transferred to the creek ponds near the hatchery, which are supplied with an abundance of fresh water and embody the most natural of conditions for the fry, where they were held and fed until June 1st. Between this date and July 30th, the fry were released at different times, as the thinning process demanded. The principal food upon which these fry were sustained was milk curd, which was procured from the creameries nearby. This character of food proved highly nutritious and beneficial to the young fish, the fact of which was attested to by the perfect condition of the fish when liberated and the loss of fish during the retention and feeding period, which was far below normal. This fall season, we were able to secure 1,314,000 Chinook eggs and 872,000 Silverside eggs. The loss to the former was 48,135 and to the latter 35,912, leaving a total of 2,101,953 eggs and fry of both varieties upon which to begin the ensuing year's operations.

COQUILLE RIVER HATCHERY.

As a result of the fall and winter operations of this hatchery, there was a total of 1,894,500 eggs of the Silverside variety and 226,000 of the Chinook variety of salmon taken. The loss of eggs and fry to the former amounted to 221,570 and to the latter 6,400, leaving an aggregate of 1,892,530 eggs and fry of both species at the beginning of the year. After hatching, these fry were all held in the troughs and artificial ponds near the hatchery and fed until April 1st, when they were transferred to the creek ponds near the hatchery until June 1st. Between that date and July 1st they were liberated at different intervals into the Coquille River. The Chinook egg take at this station has not been satisfactory the past season and an effort is being made to secure a greater supply of parent fish in the future. While the run of Chinook salmon in the Coquille River has been increasing for several years past, we have been unable to secure a sufficient number of fish at the racks. Eggs have been taken from the South Coos River Hatchery, six miles distant, to supplement the take at this station, but more eggs of this variety should be taken hereafter upon this stream. With the permission of the Board, it is my intention to make a thorough investigation of the conditions existing upon the Coquille River, with a view of making some arrangements whereby we will be enabled to procure a more satisfactory take of the adult fish and spawn in coming years. This fall season we have secured an aggregate of 461,500 eggs which are on hand for the coming year's hatchery operations.

GENERAL SUMMARY OF HATCHERY OPERATIONS

FRY LIBERATED.

From the foregoing it will be noticed that 4,816,236 Chinook, 8,624,837 Silverside and 840,242 Steelhead fry were liberated into the various streams in this district during the year 1912, itemized statement of which will be seen by the following:

TABLE.

Showing the number of fry liberated into the waters of the coast streams south of the Columbia River by the State of Oregon, during the year 1912:

Hatchery.	Chinooks.	Silversides.	Steelheads.	Where Liberated.
Tillamook.....	646,300	1,578,131	761,000	Trask River.
Yaquina.....	148,992	1,554,602	7,145	Big Elk Creek.
Alsea.....	287,645	997,455	.....	Alsea River.
Siuslaw.....	715,758	504,429	72,097	Lake Creek.
Umpqua.....	1,053,516	.....	.....	Umpqua River.
South Coos.....	1,767,170	2,317,370	.....	South Coos River.
Coquille.....	196,855	1,672,850	.....	Coquille River.
Totals.....	4,816,236	8,624,837	840,242	

SPAWN SECURED.

Although the egg-taking season at a number of the hatcheries is still in full blast, the department has so far succeeded in taking 5,664,300 Chinook, 5,346,300 Silverside and 3,867,800 Steelhead eggs, making a total of 14,969,300 eggs, full details of which will be seen in the following:

TABLE.

Showing the number of salmon eggs taken at the different hatcheries on the coast streams in the State of Oregon, south of the Columbia River, during the year 1912:

Hatchery.	Chinooks.	Silversides.	Steelheads.
Tillamook.....	1,689,000	453,000	3,767,000
Yaquina.....	818,000	2,454,000	14,000
Alsea.....	98,000	471,000	.....
Siuslaw.....	282,100	634,800	86,800
Umpqua.....	1,463,200	.....	.....
South Coos.....	1,314,000	872,000	.....
Coquille.....	.....	461,500	.....
Totals.....	5,664,300	5,346,300	3,867,800

GENERAL IMPROVEMENTS BOTH DISTRICTS

BONNEVILLE CENTRAL HATCHERY.

The work which had been planned by your body for the improvement of the Bonneville Station was started September 1st of last year, and has been in progress continuously through this year. A flume for the additional water supply, 2,400 feet long, 36 inches wide by 30 inches deep, carrying 32,000 gallons of water per minute, has been completed and was in use throughout the year. A substantial dam, 80 feet long and four feet high, was constructed at the head of the flume. A cribbing was also installed, abutting against the head of the dam and extending 90 feet along the head of the flume in order to protect it from the freshets of the creek. This cribbing is six feet wide and eight feet high and is filled with rock, making it very substantial.

Five retaining ponds, averaging 50 feet by 80 feet, lying southeast of the main hatchery building and known as ponds in the first plan unit, were constructed early in the year and used in retaining the early fry. One large pond, approximately 80 feet square, was built on the high point near where the flume discharges, northeast of the main building. Four additional ponds were constructed on the low ground south of the hatchery, the largest of which is 30 feet wide and 150 feet long. These were furnished with water from the flume and were used during the summer, as was also the one previously mentioned.

Two large natural ponds were made by placing a dam across Tanner Creek, diverting the main stream into the old channel, which allowed us to control the water passing through them, inasmuch as the ponds were above the high water mark caused by the Columbia backwater. They were used to good advantage when we found it necessary to thin out the fish in the upper ponds.

The twelve new ponds, as provided for in plans of the second unit, east of the main hatchery building, have been completed. They average 75 feet in length and 30 feet in width, and have an average depth of five feet of water. They are lined with concrete throughout and, like those of the other unit, are so constructed that they can easily be kept clean and sanitary with a small amount of labor.

We have also just brought to completion three ponds to be used in conjunction with those constructed in the early part of last year on the low ground just south of the hatchery.

With the tank ponds and the tier of ponds constructed on the hill in the early part of last year, we now have a total of thirty big fish containers, covering an approximate area of five acres. These can be used during the coming season to retain and feed the salmon and trout fry to the number of approximately forty millions.

An overshot waterwheel, ten feet in diameter, has been constructed at the lower end of the flume. It develops ten horsepower and is attached to a dynamo that generates five horsepower of electricity and this is used in lighting the plant and running the motor in the food house.

The building formerly used as a bunk house was converted into a food house, where the sustenance of the young fish is prepared. This structure is equipped with a concrete floor, and one end of it is partitioned off and converted into a refrigerating room for the temporary storing of surplus food. Four food chopping mills of different cutting sizes have been installed in the plant, as well as a retort, the capacity of which is 2,000 pounds, with a ten horsepower boiler to furnish steam for cooking the food, are other improvements at this station. This equipment is housed in a shed, 20 feet by 14 feet in dimensions. The apparatus is so handily arranged that it can be operated by one man who can prepare 2,000 pounds of food a day.

Three auxiliary hatching buildings, each 24 feet by 100 feet in dimensions, were built last fall, just south of the main hatchery. Two of these are equipped with tanks, three feet wide and two feet deep and sixteen feet long, for the purpose of holding trout fry until they are ready for replanting in the retaining ponds. The other has hatching troughs similar to those of the main building. The buildings are substantial frame structures with concrete foundations.

Many other important improvements have been made; the hatchery grounds have been cleared of brush and the low places filled in. The work of beautifying the grounds has also been taken up along the plans furnished by Mr. G. I. LaDow, of Pendleton.

McKENZIE RIVER HATCHERY.

In accordance with the plans, as outlined by your body shortly after organization, and following a tour of inspection of conditions at the McKenzie River Hatchery in July, 1911, steps were immediately taken for extensive enlargements and improvements at this station. The first work performed was the remodelling and repairing of the superintendent's dwelling, which was in a very dilapidated condition. Later on we were furnished with comprehensive plans for a more complete and better system of retaining ponds by Mr. Hensel, of Eugene, which were approved and adopted by your body. This station, being centrally located and surrounded with natural conditions, which rendered it particularly and primarily ideal for trout culture, and especially Rainbow trout, the question of an adequate water supply became uppermost and plans were submitted by the State Engineer to flume water from Finn Creek to the hatchery. After the work of constructing this flume had started we were held up by property owners along the line of the proposed

flume, who objected to having the flume across their property and served an injunction upon this department restraining it from continuing the work. Condemnation proceedings were instituted to secure rights of way over these properties, but, before they came to issue, some enterprising citizens of Eugene, who were desirous of having the work proceed without further interruption or difficulty, purchased the properties in question and gave the State a free right of way over the same. In the meantime, winter set in and we were obliged to postpone further operations until this summer. Since the whole plan of improvement, as outlined for the station, revolves around the water supply system, nothing could be done until this was complete and in operation. The flume has now been installed, but, inasmuch as your body recognizes the importance of this station and its peculiar adaptation to the propagation of trout, as well as salmon, and desires to make of it one of the best equipped and most attractive, as well as useful, hatcheries in the State, I would suggest that you go upon the ground and view the situation before the work of improvement is resumed this spring. In view of the importance of this station, not only from a practical but educational standpoint, and the loyalty and generosity displayed by the enterprising sportsmen and citizens of Eugene and vicinity, who have always shown a disposition to assist in every way towards the development of this project and have given any improvement in contemplation their hearty support and may be depended upon likewise in the future, I am satisfied that your body would enlarge upon the scope of the proposed improvements and make provision for adding to the attractiveness of its surroundings. Its value as an educational feature, aside from its usefulness and practicability, is readily seen when the fact is taken into consideration that there are numerous summer homes already established in the near vicinity of the station and more are in immediate prospect.

WILLAMETTE FALLS FISHWAY.

Following the May meeting of your body, at which time it was decided to resume activities in relation to securing an additional fishway over the Willamette Falls at Oregon City, this department, represented by Commissioner Kelly and myself, immediately began negotiations with the Portland Railway, Light & Power Company for the purpose of having the ladder installed over the company's dam and the falls. Plans for this project were drawn up by the State Engineer's department last summer, but it developed that the point of location for the proposed fishway had been previously secured by lease by the Willamette Pulp & Paper Company as a site for the construction of a new mill building and the construction of the ladder at that point would interfere with the building plans of that company. During subsequent negotiations with a representative of the Portland Railway, Light & Power Company the

proposition was made on behalf of the company that they reconstruct and remodel the present fishway, which was constructed by the State, and extensively enlarged and improved last year, along such lines as to render it adequate to the demands. Acting under the instructions of your Board, an engineer was engaged who prepared complete and comprehensive plans, embracing the contemplated improvements in detail, which were accepted by the company and the work was authorized and arranged for, but before the material could be placed upon the ground, the fall freshets, which set in earlier than usual, prevented the work from being done this season but will be begun as soon as the stage of the river will permit. In order to make provision for the spring run of salmon, however, the company will construct a temporary retaining wall along the crest of the dam to protect the fishway from the overflow occasioned by the winter and spring floods, and when the water subsides in the spring this will be removed and replaced by the permanent concrete improvements.

The plans call for the widening of the fishway throughout its entire length to not less than fifteen feet in the clear. The concrete walls are to be constructed so as to make the resting pools fifteen by twenty feet in dimensions, and the grade will be reduced so that at no place will the ascent be greater than eighteen inches. The height of the walls around the crest of the dam will be increased thirty inches above their present elevations to prevent the flood water from spilling over into the fishway and flushing the fish out of the pools. The position of the present wing dam is also to be changed to afford better protection to the fishway and the height will be raised thirty inches all along. A concrete bulkhead will be built at the head of the fishway, which will be three feet higher than the crest of the dam and walls of the fishway, and will not only serve as a protection against logs and drift but will break the current so as to allow the fish to easily enter the still water above the obstruction. The fishway will also be provided with a strong headgate which will insure absolute control of the flow of water over the ladder at all stages of the river. The pools are to be cleared of all rocks and projections. The approximate cost of the improvements, which is to be borne by the Power Company, will be about \$6,000.00.

After careful observations of the movements of the fish at the fishway during the past summer, I am satisfied that this is the best plan for the relief of the situation and will provide as nearly perfect conditions as is possible under the circumstances. While the 1911 improvements allowed the fish to get over the falls with comparatively little interruption, the improvements as contemplated in the new plans will more than double the present efficiency of the ladder.

AMENT DAM FISHWAY.

Acting under the instructions of your Board, early in April of this year, I again took up the matter of providing a permanent

fishway over the north side of the Ament Dam in the Rogue River, near Grants Pass. This work has been practically completed, which now gives us three fishways through this obstruction, and the conditions are now the best that ever existed there, for, while the fish congregate in large numbers below the dam, eventually most of them get through without serious trouble. In going upon the ground in the spring, I found that the company which had taken over the property the previous year and had agreed to construct the fishway in accordance with the State's plans, was still in bankruptcy, and I was informed by the receiver in charge of the property that there were no funds on hand with which to do the work. Inasmuch as it was imperative that the conditions be remedied before the summer run of fish began, I appealed to the court for relief, having engaged Judge E. E. Kelly as counsel, and procured an order from Circuit Judge Calkins authorizing the State to proceed with the work, the costs of which would operate as a first lien upon the property. New plans were prepared by Engineer H. E. Foster, of Medford, and the work of construction was immediately begun under the personal supervision of Deputy Fish Warden Sandry and was pushed to completion by July 1st. This fishway, which is seventy feet long and nine feet wide in the clear, with a very easy gradient and bulkheads from nine to twelve feet apart, forming ideal rest pools for the fish, is built around the north end of the dam by blasting a channel through the rocks. The total cost over all was \$1,756.00. Concrete walls and abutments were put in where necessary and, as it discharges into a large pool below the dam abutment, where the fish are wont to congregate in large numbers, when the water was turned into it, the fish took to it readily and immediately began the ascent. With the ladder on the south end of the dam, the one in the center and the new one at the north end, all in operation, this dam is well equipped with adequate means for the fish to pass up the stream and the previously existing conditions have been very materially and effectively improved.

GOLD RAY DAM.

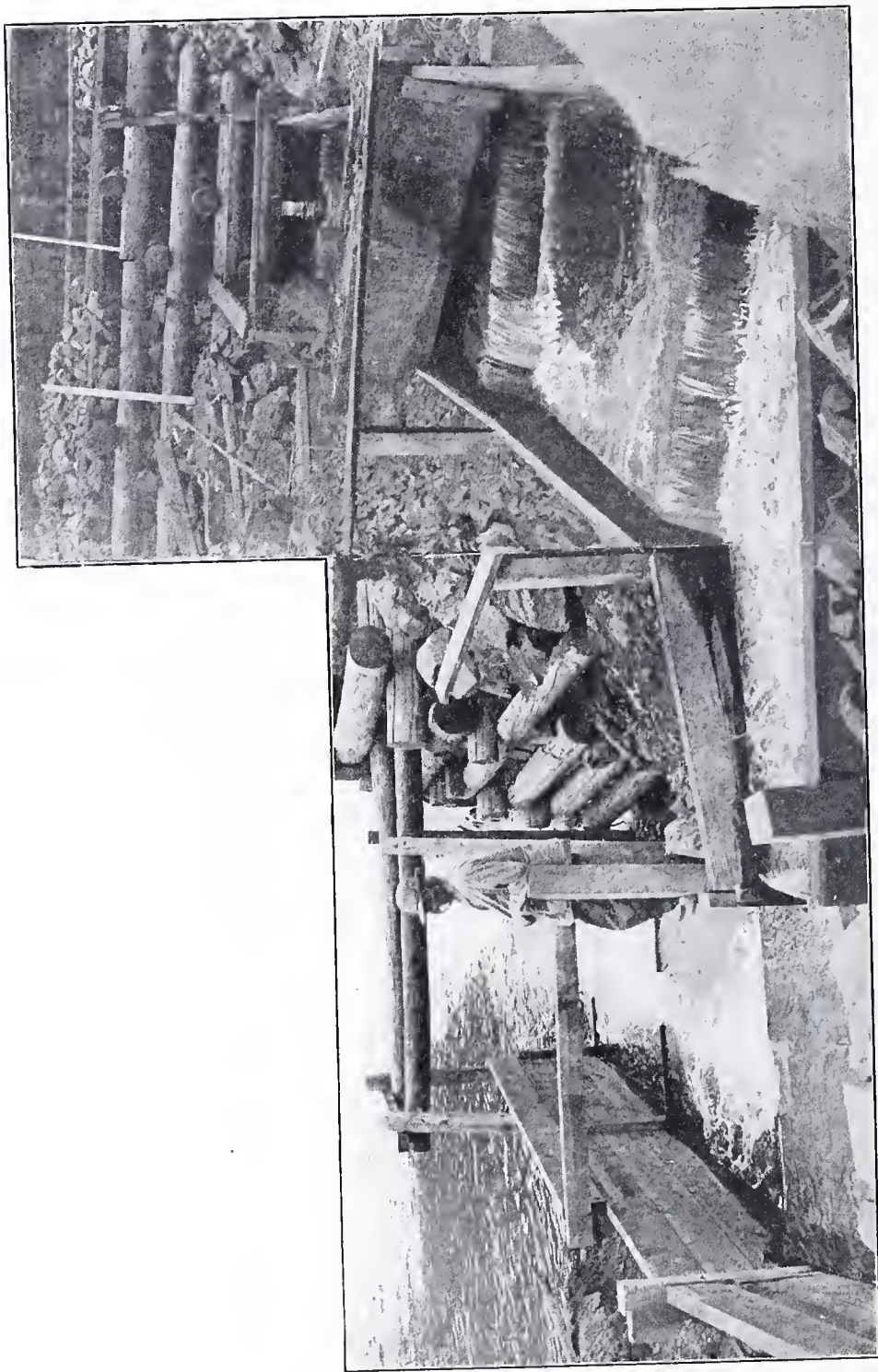
Provision having been made at the Ament Dam which permitted the fish to ascend the Rogue River above this obstruction, the situation upon this stream will not be effectually and satisfactorily remedied until the conditions existing at the Gold Ray Dam have been altered to meet the demands and I next turned my attention to this barrier. Under the conditions which were in force at this dam early this season and which have existed ever since the dam was constructed, the fishway, which is built at the north end of the dam, is out of the way from the main channel during the low water stages of the summer when the fish run. The main flow of the stream at this time of the year passes over the south end of the

dam, which attracts the fish to that side of the river, and many of them are injured by leaping against the rocks in their futile attempts to surmount the obstruction. During the summer of 1911 Colonel Ray, former manager of the property, signified his intention of building a fishway over the south end of the dam this year, which is necessary to afford the relief sought. In the meantime, however, the California-Oregon Power Company took over the property.

Early this year I took the matter up with the manager of the present company, who requested plans and estimate of the cost of the proposed fishway over the south end of the dam, which were immediately prepared and submitted by Engineer H. E. Foster, of Medford, conforming with the plans under which the new fishway over the Ament dam was constructed. After considering these plans, the company submitted a counter proposition which contemplated the raising of the south end of the dam so as to divert the current of the stream to the fishway on the north side of the river. Since the heaviest flow of the stream at all times is over on the south end of the dam, for that reason a fishway placed there would be the most feasible and beneficial, and, as a result of a conference with citizens of Jackson County, who were familiar with the conditions existing at the dam, it was decided that the plan proposed by the company would not afford the relief sought. It was accordingly rejected, and notice was prepared, embodying the plans and specifications as submitted by this department and served upon the company, allowing them until November 1st, of this year, in which to install and have the new ladder in operation. Before the term of the notice had expired a representative of the company appeared before your body and, upon reciting the conditions at the dam, as the company viewed them, rescinded the notice and gave the company permission to make the improvement according to their proposition on the south end of the dam, with the understanding that, in the event these improvements did not meet the requirements, a new ladder would be built on the south side during the coming summer. While I have not had an opportunity to inspect the dam, judging from the reports of Deputy Fish Warden Sandry upon the subject, I am led to believe that the company has not fulfilled its promise in every particular and, if this is true, I shall ask your permission to use all available means to compel the company to build the fishway at the north end of the dam, as at first proposed, as soon as the stage of the water in the river will permit.

SPRAY DAM FISHWAY.

It gives me pleasure to report at this time that, during the past season, this department has succeeded in securing the much sought for and needed improvements to the fishway over the Spray dam in the John Day River. While the ladder, in its present state, is



Fishway provided over the Spray Dam on John Day River.

a good one and will answer the purpose upon the south side of the river, I am still of the opinion that the situation will not be satisfactorily relieved until a ladder is installed at the north end of the dam, which should be done as soon as possible. Shortly after assuming the duties of this office I visited this dam and found that the fishway in its original state was not adequate and did not serve the purpose for which it was intended. This fishway was installed after plans which were furnished under former Master Fish Warden Van Dusen, who had also given his approval of it upon completion, as had also a former deputy warden of this department. After the ladder had been approved, the owners made some changes in its construction at a considerable additional expense, upon the suggestion of a deputy warden who had been sent there for that purpose. Notwithstanding these facts and that the manager maintained that he had complied with the law as he understood it, after I had pointed out the defects of the fishway and the needs of a better passageway to him, he was willing to do everything within reason to relieve conditions and agreed to remedy such defects the coming summer. Last year Mr. Black, who had been engaged to supervise such work, was sent upon the ground in September, but the fall rains had set in before the material could be delivered on the grounds and the water was so high that he was prevented from doing the work at that time. Early this year Mr. Black went upon the ground and remained there until the fishway was built and he succeeded in putting in a good one. It is constructed around the south side of the abutment, is 80 feet long by 8 feet wide in the clear with an easy gradient, and opens into the pool immediately below the dam. The headgate is so protected that it is under good control and can be operated at all stages of the river. The John Day River is a very important fishing stream and, since it drains a very large area and serves a vast number of people who are vitally interested in the free passageway of the fish up the stream, I think it necessary that prompt measures be taken to provide the relief sought, which, in my estimation, can only be fully realized by the construction of a ladder at the north end of the dam. This dam is owned and operated by a few farmers for irrigation purposes, who realize no pecuniary profit from its operation and maintenance. On that account, since they have already been put to great expense in providing the improvements to the fishway on the south side of the river and the burden of building another one on the north side is too much for them to be expected to assume; and, inasmuch as the cost of putting in such a ladder would not be great, I think this fishway should be constructed by the state in this particular instance.

FISHWAYS OVER OBSTRUCTIONS.

For many years this department has been confronted with the

problem of securing more practical and adequate fishways or ladders over the dams and other obstructions in our streams, which prevent salmon and trout from reaching the upper stretches of the streams, where the spawn may be taken and artificially propagated, or deposited on their natural spawning grounds. During the five years in which I have been identified with this department, I have given this question deep thought and, although the past year has witnessed marked advancement in the line of betterment of conditions, much remains to be done before a definite and effectual remedy is realized. While it is true that the progress and prosperity of the commonwealth depends to a large extent upon the development of the latent water powers and the reclamation of the vast areas of semi-arid lands of the state, the fishing industry should also be taken into consideration as an important revenue and wealth producer and efforts looking to its conservation should be extended every encouragement and co-operation. The dams, which must be constructed in order to utilize the streams for water power and irrigation purposes, constitute barriers which it is impossible for the fish to surmount unless they be provided with adequate means. I have visited almost all of the important dams in the state and the needless destruction of thousands of fish, by reason of these obstructions, has come under my personal observation. This works an irreparable injury to one of the state's most important assets and everything possible should be done to correct the evil. In every instance this could be avoided by providing adequate fishways which would permit the salmon, trout and other fish to proceed up the stream without conflicting, to any serious extent, with the development of water power or irrigation projects. In its efforts to enforce the law in this respect, one of the most serious obstacles which this department has encountered is the fact that the fishways over many of these obstructions, which were put in many years ago and have proven a grave menace to the fishing industry, have received the approval of my predecessors in office as to their efficiency. Some of the owners and operators of these dams have shown a disposition to stand upon what they claim their legal rights in the premises on the ground that they have complied with the law. I have taken issue with them on the contention that the law provides that an adequate fishway must be established and maintained, but when I have produced evidence in substantiation of my contentions I have, in most cases, been overruled by the courts. On the other hand, many of the owners have displayed a willingness to comply with the law and to co-operate with the department. In such cases the ladders have been remodelled or reconstructed and a great improvement over former conditions has been brought. The dams on some of the streams in this state are several hundred feet in length. It is not practical to place the fishway in the center of such dams, owing to the impossibility of reaching them to keep them clear of debris during the flood stage, and the ladder must, therefore,

necessarily be placed at one side of the dam. If only one fishway is provided, thousands of fish come up on the opposite side of the dam to the fishway and, being unable to find the ladder, perish below the obstruction. In such instances the only practical method of solving the difficulty is to place ladders at both ends of the dam, which would, in a great measure, relieve the situation. The people who live upon the upper stretches of the streams and contribute their portion to the efforts which are made to conserve the fish to the state, receive little benefit in consequence of these conditions. The rights of these people are justly entitled to consideration and they should be respected and protected by the legislature and this Board. A remedy for the existing conditions should be speedily provided and the legislature should clothe this department with more power with which to meet and cope with the situation. Provision should also be made for the employment of a competent man to go into the field, make a thorough investigation of the conditions existing upon all of the streams, and capable of draughting plans and specifications for a uniform and practical system of fishways and to supervise the installation of the same.

RETAINING PONDS

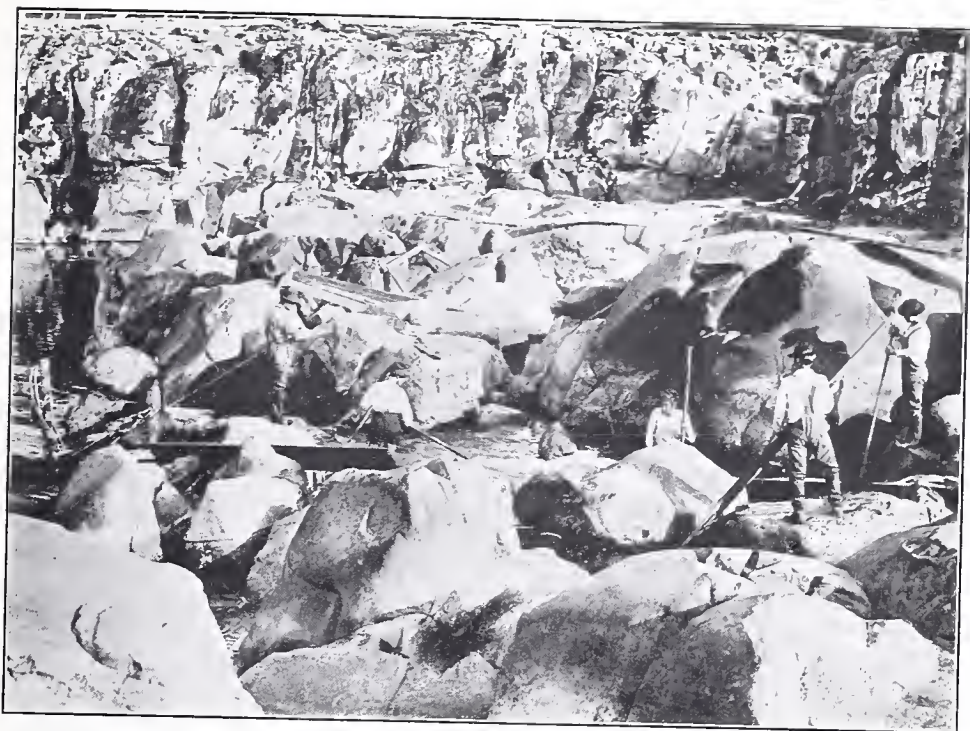
As a result of the extensive and thorough experiments which have been conducted at the Bonneville and other stations, in the effort to systematize the pond arrangement in order to procure the best results with the fish, we have found that the auxiliary ponds which are formed by damming the small streams in the vicinity of the hatcheries afford the most natural conditions for the young fish after they have attained a growth sufficient to warrant their transfer to these ponds, where they invariably take on a healthy and rapid growth. When the fish were large enough to be taken from the hatching troughs, we found it necessary to transfer and hold them in the artificial nursery ponds at the hatcheries where the water flow is under complete control and which are so constructed that their sanitation can be properly attended to, by seining the fish to one end while the other is being cleaned and vice versa. Extreme care has been exercised at all times to insure perfect sanitation of these ponds, as well as the proper aeration of the water so as to provide as nearly natural conditions as is possible for the fish in artificial ponds. When the danger of spring freshets was past and the water in the creek ponds could be kept under control, the fry were transferred to the creek ponds, where the natural and continuous flow of fresh water, logs, rocks, etc. (which provide shelter and shade) afford the most natural conditions possible to produce. Then, too, the fish are enabled to secure the food which nature has provided for them, in addition to that given them, and they become

gradually weaned from the nursery diet and are far better equipped to look out for themselves when turned out into the natural streams. As a result of our experience, we find that the best results are attained by pursuing this course as the fish, when liberated, are then in prime condition to protect themselves from their predatory enemies on their way to the sea.

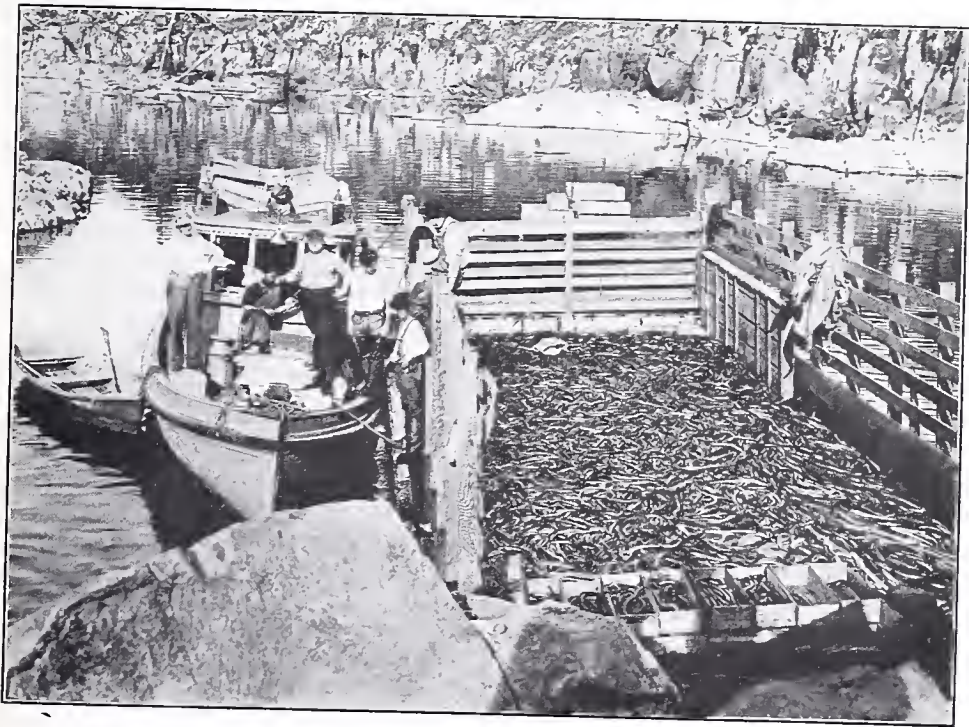
Acting under instructions, the superintendents of the different hatcheries have given the subject of aeration close attention and it is the consensus of opinion that some parts of the artificial ponds should be agitated to promote the proper circulation of air while other parts of the ponds should not be disturbed so as to provide recreation nooks for the fish. Further investigations will be continued along the above lines during the coming year, looking to the early and definite solution of these questions, which are of the greatest importance to the success of the system of retaining and feeding the young fish.

FEEDING FRY IN PONDS.

In our efforts to determine upon a scientific and systematic method of feeding the young fish in the troughs and nursery ponds in order to secure the best results at a minimum expense, we have conducted a series of practical experiments at all of the hatcheries the past year, and, although we have made some valuable discoveries and rapid strides of improvement over previous methods, we are continuing our experiments unceasingly in the hope of reducing the cost to the greatest degree of economy consistent with the highest degree of health and development of the young fish. Experience has led some of the hatchery superintendents to believe that fresh liver constitutes the best kind of food for the fry in the early stages of their development, since it can be ground up finer than other foods and the blood contents are highly nutritious. Although the cost of liver is somewhat greater than some of the other foods, the difference is not material owing to the comparatively small quantities required. At some of the stations, however, we are unable to secure a sufficient supply of liver, owing to the remoteness of the hatcheries, and, in such instances, we substitute a mixture of ground dried salmon and mush (composed of middlings and other wheat product) in proportions of sixty and forty per cent, respectively, which has proven a very satisfactory article of diet for the extremely young fry. At one of the coast hatcheries milk curd, which was secured from nearby creameries, was also fed and satisfactory results were realized at a moderate cost. As the fish grew larger, we have fed them upon ground and prepared (cooked) smelt, lamper eels, spent salmon and salmon offal from the canneries, any and all of which can be procured cheaply and are of excellent food value. It is necessary that this quality of food should be fresh and absolutely



Gathering eels for food for salmon fry from the pools at the Willamette Falls Fishway at Oregon City.



Fifteen tons of eels aboard a scow for delivery to cold storage plant to be preserved for food for young salmon fry.

free from taint, and due care is exercised by the superintendent to insure this condition before utilizing the material. When any of this nature of food is found tainted and unfit for use, however, it is placed in the maggots and suspended over the ponds where the fly larvae are allowed to develop and drop automatically into the ponds, where they are seized and devoured by the fish. In this way all of the food value of the material is beneficially utilized and the waste that accrues is very nominal. While there was some waste of food at a few of the stations, it was due to the superintendent in charge, who, not being able to give the matter his personal supervision at all times, entrusted the responsibility to the judgment of unexperienced and careless employees. As a result of this experience, it is believed that a great saving can be made by the employment of reliable and trustworthy men to devote their entire time and attention to the feeding of the fish and the superintendents in charge of the larger hatcheries have been instructed to adopt this policy in the future.

It has been conclusively demonstrated, by thorough experimentation and observation, that the best results are obtained by feeding ground eel raw, when the fry attain age and size sufficient to properly digest it, but the smelt, spent salmon and salmon offal, which contain bones, should be ground and retorted before being fed.

There was fed to the young fry at the different hatcheries of the State during the past year, fifty tons of smelt; twenty-seven tons of eels; fifteen tons of middlings (wheat products); eight tons of salmon offal, fresh from the canneries; five tons of salmon offal, canned in one gallon cans; fifteen tons of liver; four tons of salmon offal, salted; ten tons of dried, spawned out salmon; ten tons of fresh spawned out salmon; five tons of milk curd and one ton of salted spawned out salmon, making a total of 150 tons or 300,000 pounds of food fed at all stations at an aggregate cost of \$3,400.00. This includes the actual cost of the food materials purchased and the estimated cost of collecting and transportation of the fresh, canned and salted salmon offal, which was donated free of charge by the canneries, as well as the estimated cost of labor in the curing and handling of the dried spawned out salmon at the hatcheries.

MARKING OF LIBERATED SALMON FRY.

In order to definitely determine the movements of the young fry which were held and fed at the hatcheries until they had reached a size of from three to five inches, after being liberated into the streams, a systematic investigation was made by this department last year and the early part of this year, the results of which warranted the conclusions that the young fish not only departed from the tributaries into which they were liberated and made their way leisurely to the open sea, but that they were in a strong and healthy

condition and better prepared to protect themselves from their enemies. These investigations also demonstrated conclusively that the policy of holding and feeding the young fish in the retaining ponds is a wise one and has a tendency to explode the theory, often advanced, that this system would result in the domestication of the young fry to the extent that they would not leave their native streams. For the purpose of our investigations, 60,000 young salmon fry were marked at the Bonneville Station, of which 33,000 were of the Blueback or Sockeye variety, and 27,000 were Chinooks. These were marked by clipping a V-shape in the gill cover, and were released from the hatchery ponds into Tanner Creek, together with 250,000 others, equally divided between Blueback and Chinook fry, on October 16, 1911. Young fry, which had been previously liberated from the ponds, still lingered in the stream in the vicinity of the hatchery, when these were turned out, and they practically all remained until a rainstorm caused a freshet, when they all disappeared. On October 18th, equipped with a seventy-foot seine, ten feet deep, with a quarter-inch mesh, Chief Fish Culturist Wilson, Deputy Warden Gor, Water Bailiff Mitchell and myself made several hauls down the stream with no results, indicating that all of the fish had left the small streams and gone into the Columbia River. We followed on down the Columbia, making frequent experimental hauls, in all of which we found marked fish. The last haul upon this trip was made on the Washington side of the Columbia, opposite the mouth of the Willamette, fifty miles below the mouth of the hatchery stream, where we also secured a number of marked Chinook and Blueback fry, which showed that the fish had travelled this distance in thirty-three days. The fish of the last catch were larger and stronger than those of the previous hauls, indicating that the stronger fish were migrating in advance of the others. The work was then abandoned until January 19th, of this year, when it was resumed. Young fish were then found in equal numbers on both sides of the river and near the islands, showing the equal distribution of same in the stream. The first trial was made at Rainier, near the docks, where a large number of Chinook were taken. Of fifty-five fish caught nine were marked with our brand and one was marked with a silver wire through the dorsal fin, which had been released from the United States Hatchery on the Clackamas River. We continued our investigations down the stream, accompanied by a number of fishermen who showed deep interest in the work, until we reached Crandall's seining grounds, thirty miles above the mouth of the Columbia, where we also secured a number of marked fish. Owing to the flood stage of the river and the unfavorable tides, we were obliged to discontinue our investigations for the time being and did not resume the work until April 10th of this year. The first haul made upon this last trip, at Alderbrook, near Astoria, brought up a number of young Chinooks, including four marked ones. We also made hauls on Sand Island, up Young's Bay, at

Desdemona Sands, and at almost every point, with the exception of Young's Bay, marked fish were secured. The fish were all in the finest condition and samples of same were retained and are preserved in my office. We were agreeably surprised at the number of marked fish taken and the excellent condition in which we found them, as they had more than doubled in size since leaving the hatchery ponds. Though our seine was small and we could only operate in shallow places along the banks and on the sand bars of the river, our investigations proved that there were a great number of young salmon in the river, equally distributed over its entire breadth, and, since we did not find any fish that appeared to have been hatched prior to the previous season, we were led to believe that the greater portion of them linger in the fresh water for a long period, probably from a year to eighteen months before going out to sea. It is my opinion that, while a few young fish may remain in the stream, the bulk of them go out during the May and June freshets. This theory has not been proven, however, but, as there were a number of fish marked and turned loose from the Bonneville and Klaskanine Hatcheries, this fall, the investigations which we intend to conduct this coming fall should determine whether or not this is a fact.

Another interesting feature of the investigations was the fact that, after the trials of the first trip last fall during which we secured as many marked Bluebacks as Chinooks, no further trace of the Bluebacks was found, and what became of them is a question which I am unable to satisfactorily answer at this time. The wisdom of holding and feeding the young fish was also borne out by the fact that, at every haul made, in addition to the young salmon, we caught large numbers of bass, suckers, croppies, carp and other predatory fish which would have preyed upon the very young salmon had they been turned out at a more tender and defenseless age.

MARKING FRY.

As heretofore stated, for the purpose of determining when they return to the river and for following them on their journey down the river to the coast, 27,000 Chinook and 33,000 Blueback fry were marked at the Bonneville Hatchery last fall by clipping a V-shaped hole in the right gill cover, and liberated October 16, 1911, in Tanner Creek.

This mark was adopted through the suggestion of the reports of similar markings in Japan, but it was not entirely successful. While we were able to follow the fish on their migration to the ocean, it was found in examining some that had been retained, a year later, that a number still carried the mark well, but in others it had begun to grow over. From these observations I am inclined to believe that, although some of these fish will show the mark when they

return to the river, it may not be plain enough to attract the attention of the fishermen. For this reason an entirely new system of marking was adopted in this year's work.

During the past summer 43,740 Chinook fry were marked at the Klaskanine River Hatchery by cutting off the adipose fin and clipping a V-shape in the lower caudle or tail fin. These fish were liberated August 15th, after reaching a size of four inches.

At Bonneville 18,000 of the same specie of fry were marked by removing the adipose fin and clipping a V in the upper caudle or tail fin. These were liberated August 20th, averaging three and one-half inches in length. Specimens of these fish, examined three months later, showed no indication of the tail marks growing out. As marking of a similar nature is known to have been successful elsewhere, the adult fish having been captured in the Columbia River with the mark plainly visible, similar results are expected from our work.

DESTRUCTION BY SEALS, SEA LIONS AND PREDATORY BIRDS.

It is well known to fishermen and to those who have made a study of conditions, that large numbers of salmon are destroyed each year by seals and sea lions. A peerless food fish, of distinct use to mankind and one of Oregon's largest sources of wealth, is preyed upon by an animal which is of very little use, if, indeed, it has any value at all. These seals and sea lions breed along the rocky cliffs abreast of our salmon streams, and follow the fish in their migrations along the coast, killing and eating as they go, and often pursuing the salmon inside the mouths of the rivers.

The percentage of fish destroyed by these animals is perhaps larger than is generally supposed. The Silversides are their especial prey, because this variety of salmon, in seeking a spawning stream, follows the shore so closely but they also destroy many thousands of the more valuable Chinook every year, as well as the other varieties of salmon.

In 1909 the legislature appropriated \$1,000.00 for the purpose of destroying seals and sea lions at the mouth of the Columbia River. Three expert hunters were employed, and from April 17th to May 15th of that year, operating from the end of the jetty, they killed 356 sea lions and 46 seals, besides wounding many others that probably died. From May 22d to July 24th, on the breeding rocks at the mouth of Elk Creek, they killed 242 seals and 314 sea lions, making a total of 288 seals and 670 sea lions. This remarkably good work was accomplished within the appropriation, the total expense, including guns, ammunition, tents, salaries and other expenses, being \$945.47. It was observed by fishermen that year that a much smaller percentage of the fish taken were marred and

marked than in other years, when there had been no attempt made to check the depredations of the amphibious foes of the fish.

This is a serious matter. It is a menace to the fishing interests of Oregon, and I believe that some means should be provided for the extermination of the seals and sea lions on the Oregon coast. In many cases fishermen would give their time to hunting the animals if the department would furnish them with ammunition. One thing certain is that steps should be taken to decrease the percentage of fish that find their way to the voracious maws of these pests, instead of into the nets of the fishermen or up the rivers to spawn.

There are a number of birds, all of which are protected by law, that constitute another serious menace to the continuance and growth of the fishing industry. Cranes, shags, fishducks, kingfishers and other predatory birds are continually gorging on the young fry from the time they are spawned until they reach the ocean. Among the most destructive is the shag. These birds have large rookeries all along the coast, where they breed in thousands, and their principal diet is young salmon and trout. For the purpose of investigation the department caused to be killed thirty of these birds in two days at a rookery on lower Rogue River, and in the crop of each bird were from five to twenty trout and salmon fry. Their destructiveness may easily be seen from this instance.

As in the case of the seals and sea lions, some means should be provided for the protection of the fish from predatory birds, and extermination seems the only remedy in both cases.

FISH EXHIBITS

STATE FAIR DISPLAY.

In compliance with instructions from your body, following the August meeting, exhibits of fish and hatchery work were made at the State Fair at Salem and the Eastern Oregon District Fair at Pendleton the past fall. The exhibit at Salem was under the supervision of Superintendent Greenman of the Bonneville Central Hatchery, and, although a fine collection of live fish of every native variety in the State was secured and placed upon display in glass tanks, and a miniature hatchery was installed, showing eggs in the different stages of incubation, the exhibit was not satisfactory on account of the water supply, which was pumped from a well upon the grounds, being oily and not only detrimental to the success of the hatchery exhibit but rendered the live fish in the tanks almost invisible. Every effort was made to make a success of the exhibit, an engine having been installed to repump the water back into the tanks in the hopes of clarifying it, but without avail, and it was necessary to replenish the supply in the tanks with fresh water in

order to keep the fish alive. Since we have had poor success for two successive seasons at the State Fair, on account of bad water, I do not think it advisable to attempt to make future exhibits there until these conditions are remedied.

PENDLETON EXHIBIT.

While we were not successful with our display at the State Fair at Salem the results realized at the Pendleton District Fair were just to the contrary where the exhibit proved a grand success and highly satisfactory in every particular. This exhibit was made under the supervision of Chief Fish Culturist I. H. Wilson, with the assistance of Mr. G. I. LaDow, of Pendleton, who gave his time and attention to the installation of the exhibit and to whom much of the credit for the success of the display is due. Four large cement tanks or basins, which had been previously built in the pavilion, were utilized and formed an important part in the general setting of the exhibit. An ample supply of good water enabled us to construct a miniature waterfall, which tumbled over an embankment of moss-covered rocks, which, with an appropriate background of beautiful mountain landscape scenery, formed a most attractive setting for the general arrangement of the display. From the cement basins a miniature river wound gracefully down a gently sloping, moss-covered incline, in which young salmon fry disported themselves and were captured by a miniature fish-wheel—to be released again—to the amusement and edification of the delighted spectators, who filled the exhibit space to the capacity limit at all times. Upon this stream were arranged the different methods of taking salmon, as they are operated in reality on the principal fish streams of the state, and a miniature hatchery was shown with eggs in the different stages of incubation. The large basins contained all of the different species of native trout, salmon, bass, croppies, sunfish, yanks, etc., of various sizes and ages, and this feature of the exhibit was supplemented and augmented by glass tanks containing different species of native fish, and all kinds of shell fish, such as crawfish, crabs, oysters, clams, turtles, etc., and there was also a complete display of the different species of fish of all ages and sizes, as well as shell-fish in formaldehyde solution, as well as a collection of preserved salmon eggs in all stages of incubation, from the time they were first taken until hatched, which formed an interesting and highly instructive feature of the exhibit as a whole. The center of attraction in the exhibit, however, was the display of two 30-pound Royal Chinook salmon, male and female, which had been transported a distance of over 200 miles for the purpose of the exhibit, this being the first time on record that this had ever been successfully performed wherein the fish were kept alive. We were accorded the hearty support of the people and the management of the fair in

every way possible, who displayed a genuine interest in making of the exhibit a success, and it proved not only the chief attraction, of the Exposition but highly valuable as an educational feature. Numbers of people who had seen numerous other fish exhibits pronounced this one equal to any they had ever seen and officials of district fairs in other parts of Eastern Oregon, who visited the exhibit, were so well pleased with it and appreciated its value as an attraction and educational feature that they strongly urged a reproduction of the display in their respective localities in the future.

SHELLFISH INDUSTRY.

There are a number of clam beds along the coast of Oregon from which clams have been taken and shipped in commercial quantities for a number of years, but the greater portion of the product has been disposed of in the local market and no record can be obtained of the exact scope of the industry.

The crawfish industry is also of considerable importance to the state, this variety of shellfish being principally confined to the Columbia River and its tributaries, but the most of the product is shipped to the Portland market. A great number of fishermen depend upon this industry for a livelihood. The same is true of the crab industry, along the coast as well, of which there is an abundant supply in evidence, and, as in the case of clams and crawfish, they are shipped to the Portland market in large quantities, providing subsistence to scores of fishermen and their families.

The native oyster industry is practically confined to the Netarts Bay, in Tillamook County, and Yaquina Bay, in Lincoln County. There are some other points along the coast, however, where, it is thought, by transplanting, the industry could be developed to a paying commercial basis. The area of the oyster beds of the state has never been surveyed and definitely determined, but I am satisfied that it is greater than is generally supposed and confident that the industry could be fostered and built up to one of great importance to the state as a revenue and wealth producer. Up to the present, however, no funds have ever been provided with which to carry on research or propagation work in any branch of the industry.

Several years ago the state took the matter up with a view of enlarging the scope and the perpetuation of the industry and the legislature provided means for a systematic experimentation upon the feasibility of the introduction and propagation of the Eastern oyster in Oregon waters. State Biologist Sweetser was placed in charge of this work and pursued a thorough and scientific course of experiments in the propagation of the Eastern oyster, but his efforts did not produce the desired results from a practical point of view. Private parties, who were interested in the conservation and development of the oyster industry, carried on a series of

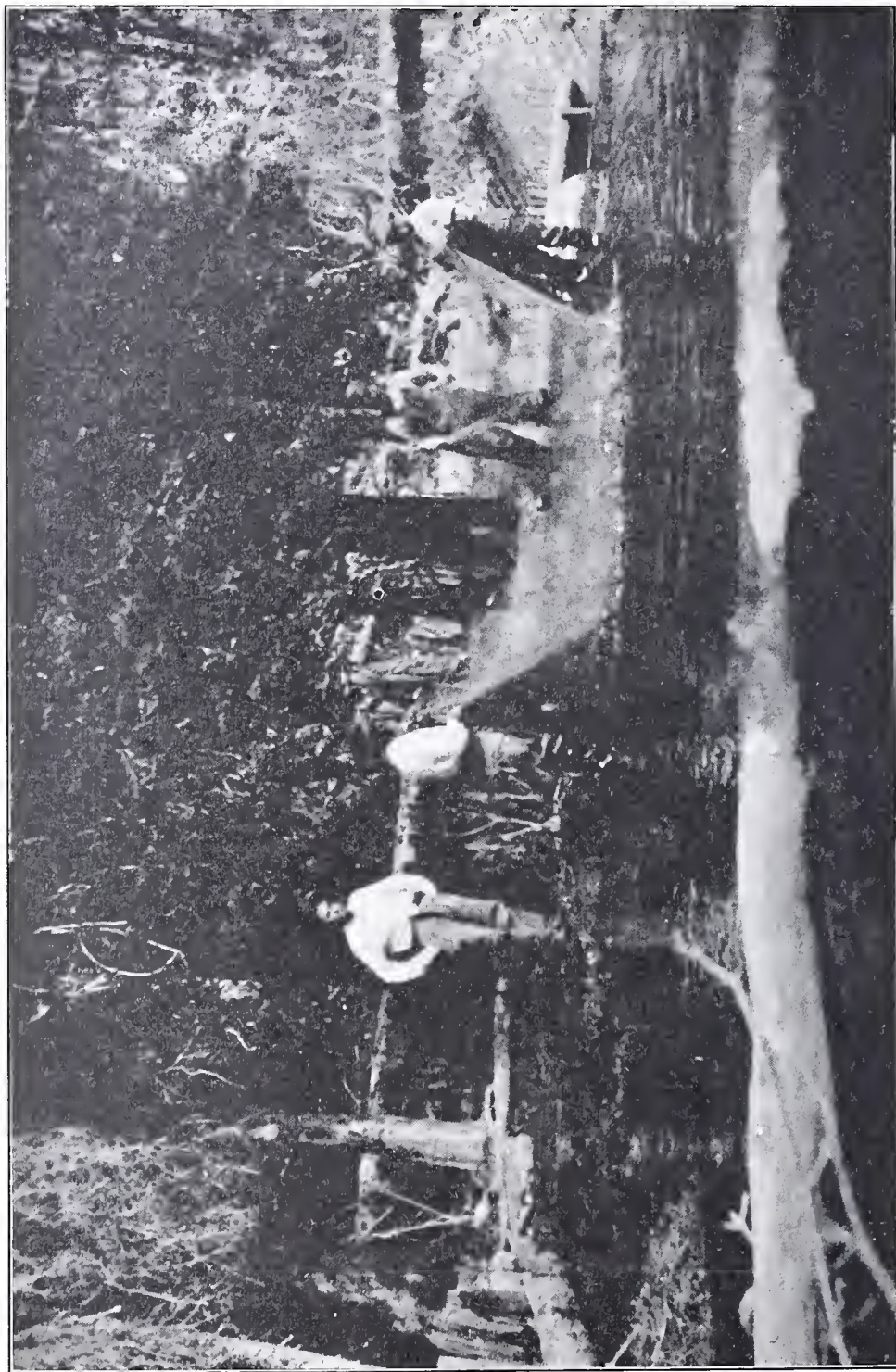
experiments with this specie to better success. Having become convinced that the temperature of the water from the ocean was too low for the Eastern variety of oysters to spawn, they planted the spat in the bed of a slough where the tide flow and the temperature could be regulated. As a result, they succeeded in inducing the oysters to spawn and to reproduce their specie. These experiments, however, were not conducted upon an extensive scale.

While the shellfish industry has been placed under the jurisdiction of this department for regulation and protection, comparatively little attention could be given it up to the past year, when, acting under the instruction of your Board, a partial investigation was made. A more thorough investigation should be conducted and systematic efforts should be made looking to the development of the shellfish industry so as to place it upon a permanent and substantial commercial basis as a revenue producer.

Since no money has been provided for the regulation and protection of the industry, some license fee system should be devised to provide the necessary funds for the government of the oyster, crawfish, clam and crab industries. This applies more especially to the crawfish industry, as we have had considerable trouble in enforcing the law regulating the closed season on crawfish since the industry was placed under the jurisdiction of this department. No provision has been made for compulsory reports upon the product of the different species of shellfish, hence an accurate accounting of the output cannot be made. A partial report upon the shellfish output of the State, insofar as the records of this department will permit, however, is embraced in a tabulated statement contained elsewhere in this report.

TROUT OPERATIONS.

While the State has been devoting considerable attention and spending a great deal of money towards the propagation of salmon in past years, very little has been done for game fish until the organization of your Board last year, when it was decided to carry on the propagation of trout at the different hatcheries in conjunction with salmon propagation. Organization was not effected, however, until too late in the season to make preparations for last year and active work was not taken up until this year. Notwithstanding the fact that this was the first year's work, since we had had no previous experience in the taking of trout spawn and our movements were to a great extent guided by the advice of others whom, we afterwards found, did not understand the work, our operations were greatly interfered with and retarded by high water and other adverse conditions; but, when all things are taken into consideration, the results realized have been very satisfactory. From the knowledge gained of this year's experience, we are now equipped to overcome the



Seining for rainbow trout in Strawberry Lake for spawning purposes.

obstacles which have stood in our way in the past and will, no doubt, have far better results in the future. After deducting a normal loss during the incubation period, an aggregate of 4,608,865 young trout of the different species were hatched and handled by the different State hatcheries and turned over to the Game Department for distribution, and 20,000 trout, equally divided between the Eastern Brook and Black Spotted varieties, are being held at the Bonneville Central Hatchery for breeding purposes. As we have no records of the disposition of the fish after they leave our hands and can give no account of the same, detailed information upon this matter is contained in the report of the State Game Warden. Chief Fish Culturist Irwin H. Wilson, who is general superintendent of the trout work for this department for the entire State, has submitted a full report covering the trout operations in detail, the full text of which follows:

TO THE MASTER FISH WARDEN:

During the early fall of last year, investigations were made at the various coast hatcheries for the purpose of arranging for the taking of spawn of the Black Spotted trout, which I was informed came into those streams in large numbers. It was found in this investigation that at the Tillamook, Yaquina, South Coos and Siuslaw River Hatcheries permanent racks with traps attached were already in the streams for the purpose of taking salmon. It was thought that these traps with some remodelling, in installing closer screens, could be used for taking trout and instructions toward this end were accordingly given to the different superintendents. Trout seines were also furnished so that seining could be done in the various streams and orders were given that no efforts in the taking of this particular variety of fish were to be spared. It was found, however, that the trout, unlike the salmon, refused to come into the traps in numbers, and this, coupled with the fact that the work was being done for the first time with no past experience to rely upon, caused our efforts to be much less successful than we expected. Some spawn of this variety was taken, but not in the numbers we hoped for. We found at this time, however, that the trout would have to be taken at any time we could secure them, and be held until they were ripe for spawning purposes. Accordingly the necessary arrangements toward this end were made for this year and we had much better results. Ponds for retaining these trout were constructed at the four plants mentioned.

We have now at the Yaquina Hatchery 1,000, Siuslaw River Hatchery 465, South Coos River Hatchery 600, and at the Tillamook Hatchery 200 adult fish, making a total of 2,265. These are from twelve to thirty inches in length. As the heavy run of these fish does not come until January, our prospects are good for another large take, which will assure us a great quantity of spawn.

Hatchery operations in the propagation of trout at Bonneville, on the whole, has been very satisfactory. Considerable loss, however, was experienced in eggs shipped in from outside of the State, due to improper packing. This was heaviest in shipments of Eastern Brook trout eggs from Rhode Island and Black Spotted trout eggs from Montana. The loss in the former was almost fifty per cent, while one shipment of Black Spotted spawn, consisting altogether of 306,000 eggs from Montana, was practically ruined through becoming overheated while en route.

Entirely satisfactory were the results obtained with the spawn supplied by the United States Bureau of Fisheries and our own stations. Altogether 4,608,865 fry, which had reached the fingerling stage, were turned over to the Game Department for distribution.

Early in April racks were installed on Hill's Creek, Salmon Creek and North Fork Creek, tributaries of the middle fork of the Willamette, for the taking of spawn of the Rainbow trout. Continued high water prevented our obtaining any results and after a time the work was discontinued and the rack material placed in positions safe from the danger of being washed away. A number of small creeks tributary to the McKenzie River, above the McKenzie Hatchery, were also racked for the same variety of trout. Here again, the high water interfered, but we were successful in securing 195,000 eggs of this specie. These eggs were taken to the McKenzie River Hatchery and, with others shipped in, 400,000 fry resulted therefrom, which were eventually liberated under the direction of the Game Warden's department. From the result of last fall's take, we have 800 adult Rainbow trout and 10,000 fish of the same specie, hatched the year previous, all of which are being held for spawning purposes. Prospects are excellent for securing a much better take here during the coming spring.

During the latter part of April preparations were made for the taking of Black Spotted and Rainbow trout spawn from Olive and Strawberry lakes in Grant County. We were misinformed regarding the time when the trout began spawning in those lakes and it was found that the work had been taken up earlier in the season than was necessary. We were told that the fish would begin spawning about May 1st, and in order to get upon the ground at that time, it was necessary to traverse eight miles of the distance over the route to the lakes over snow five feet deep. Olive Lake is thirty-two miles from Sumpter and the last part of the journey had to be made on snowshoes with dog teams to haul the supplies. Strawberry Lake is twelve miles from Prairie City and two miles of it had to be traversed on snowshoes. Lumber and supplies for this point were pulled in over the latter stretch with hand sleds. This unnecessary expense and hardship was due to the misinformation that we received in regard to the matter, as we learned later that the fish there do not begin to spawn until the middle of June.

As we now have the material on the ground and the knowledge of when the fish spawn, this expense will not be incurred again this summer, as men will not be sent in until the roads are open.

Early in the season a rack was placed above the fishway leading over the dam in the North Umpqua River, at Winchester, for the taking of trout spawn. Later on, a section of the dam was washed out through which the fish escaped and this venture was a failure. A failure was also experienced on the North Santiam, where we made repairs in an old dam at Niagara. At this place, continued high water prevented our accomplishing anything.

Last fall investigation was made by Commissioner Kelly and myself at Odell and Crescent Lakes and Deschutes Marsh, in Klamath County, for the purpose of selecting a location where Rainbow trout spawn can be taken during the coming season. It was decided to operate both at the intake and outlet of the three places and lumber for racks and troughs was secured and is on the ground. Provisions have also been stored nearby and everything is in readiness for the beginning of this work in the early spring. We also have material on the ground at Spencer Creek, below Klamath Falls, where operations are to be carried on this season.

This was our first season with trout propagation work and we were handicapped, through a lack of knowledge of the most suitable locations for spawn taking operations, and were compelled to depend largely upon information furnished by outside parties who had had no experience in the work and who invariably overestimated the amount of fish that frequented the streams in their localities. Notwithstanding all of these handicaps, I consider the results as most encouraging. From the results of our labor, we have turned over to the State Game Department for distribution 4,608,865 trout of various species. In addition, we have 10,000 Eastern Brook and 10,000 Black Spotted trout which we are holding at the Bonneville Central Station for breeding purposes.

While the unfavorable conditions mentioned above have made the cost of the fry secured during the past year much higher than it would have been otherwise, we have gained much valuable experience which will be put to good use in our future work. If our prospects materialize, our output of trout fry will be many times greater than during the previous year.

TABLE.

Showing the entire product of salmon and other food and shell fishes, taken from the waters of the State of Oregon, including the entire Columbia River, during the year 1912, and its relative comparison with the product of 1911:

Specie of Fish	1912 Number of Pounds.	1911 Number of Pounds.	Increase, Number of Pounds.	Decrease, Number of Pounds.
Chinook salmon.....	25,833,184	34,115,925	.....	8,282,741
Silverside salmon.....	8,935,084	10,726,160	.....	1,791,076
Blueback salmon.....	734,229	496,216	238,013	.....
Steelhead salmon.....	2,758,181	2,266,387	491,794	.....
Chum salmon.....	2,230,665	2,205,087	25,578	.....
Sturgeon.....	872,585	271,952	600,633	.....
*Shad.....	1,137,975	741,752	396,223	.....
*Smelt.....	320,336	174,639	145,697	.....
*Catfish.....	21,111	7,988	13,123	.....
*Tom Cod.....	24,693	15,206	9,487	.....
*Carp.....	19,478	4,153	15,325	.....
*Black Bass.....	3,366	2,049	1,317	.....
*Herring.....	8,404	10,780	.....	2,376
*Flounders.....	22,230	19,715	2,515	.....
*Perch.....	18,074	16,666	1,408	.....
*Oysters.....	58,135	239,264	.....	181,129
*Clams.....	262,575	212,212	50,363	.....
*Crabs.....	294,532	328,633	.....	34,101
*Crawfish.....	132,843	10,640	122,203	.....
	43,687,680	51,865,424	2,113,679	10,291,423

*Take on Washington side of the Columbia River not included.

RECEIPTS.
DISTRICT No. "1."
1912.

From licenses issued, as follows:

1,220 gill-nets at \$5.00.....		\$ 6,100.00
332 set-nets at \$2.50.....		330.00
51 traps at \$25.00.....		1,275.00
7 scow wheels at \$25.00.....		175.00
24 stationary wheels at \$35.00.....		840.00
47 seines, 67,200 feet, at \$0.03.....		2,016.00
310 fish dealers (1st class) at \$5.00.....	\$1,550.00	
1 fish dealer (1st class, new) at \$15.00.....	15.00	
30 fish dealers (2d class) at \$7.50.....	225.00	
13 fish dealers (3d class) at \$10.00.....	130.00	
10 fish dealers (4th class) at \$15.00.....	150.00	
2 fish dealers (5th class) at \$20.00.....	40.00	
1 fish dealer (6th class) at \$25.00.....	25.00	
1 fish dealer (7th class) at \$30.00.....	30.00	
1 fish dealer (8th class) at \$40.00.....	40.00	
3 fish dealers (9th class) at \$50.00.....	150.00	
1 fish dealer (10th class) at \$60.00.....	60.00	
1 fish dealer (13th class) at \$100.00.....	100.00	
4 fish dealers (14th class) at \$125.00.....	500.00	
1 fish dealer (15th class) at \$160.00.....	160.00	
1 fish dealer (16th class) at \$200.00.....	200.00	
1 fish dealer (17th class) at \$270.00.....	270.00	
1 fish dealer (18th class) at \$360.00.....	360.00	
1 fish dealer (21st class) at \$630.00.....	630.00	
1 fish dealer (23d class) at \$810.00.....	810.00	5,445.00
1 canner (1st class, new) at \$300.00.....	\$ 300.00	
1 canner (2d class) at \$150.00.....	150.00	
1 canner (3d class) at \$200.00.....	200.00	
1 canner (5th class) at \$300.00.....	300.00	
1 canner (6th class) at \$350.00.....	350.00	
1 canner (7th class) at \$400.00.....	400.00	
1 canner (9th class) at \$500.00.....	500.00	
1 canner (12th class) at \$650.00.....	650.00	
1 canner (13th class) at \$700.00.....	700.00	
1 canner (14th class) at \$750.00.....	750.00	
1 canner (25th class) at \$1,500.00.....	1,500.00	5,800.00
Total for licenses issued.....		\$22,481.00
From fines imposed for violations of the law.....	\$ 745.47	
From the sale of confiscated salmon and gear.....	1,840.82	\$ 2,586.29
From the sale of unused property.....		55.00
Total for District No. 1.....		\$25,122.29

RECEIPTS.

DISTRICT No. "2."

1912.

From licenses issued, as follows:

622 gill-nets at \$5.00	\$ 3,110.00	
1,909 set-nets at \$2.50	4,772 50	
30 seines, 18,762 feet, at \$0.03	562.86	
172 fish dealers (1st class) at \$5.00	\$860.00	
3 fish dealers (1st class, new) at \$15.00	45.00	
8 fish dealers (2d class) at \$7.50	60.00	
1 fish dealer (2d class, new) at \$22.50	22.50	
10 fish dealers (3d class) at \$10.00	100.00	
3 fish dealers (4th class) at \$15.00	45.00	
3 fish dealers (5th class) at \$20.00	60.00	
1 fish dealer (6th class) at \$25.00	25.00	
1 fish dealer (7th class) at \$30.00	30.00	
2 fish dealers (8th class) at \$40.00	80.00	
4 fish dealers (10th class) at \$60.00	240.00	
1 fish dealer (11th class) at \$70.00	70.00	
1 fish dealer (12th class) at \$80.00	80.00	
1 fish dealer (14th class) at \$125.00	125.00	1,842.50
2 cannery (1st class) at \$100.00	\$200.00	
6 cannery (2d class) at \$150.00	900.00	
3 cannery (3d class) at \$200.00	600.00	
4 cannery (4th class) at \$250.00	1,000.00	
1 cannery (5th class) at \$300.00	300.00	3,000.00
Total from licenses issued		\$13,287.86
From fines imposed for violations of the law	\$845.07	
From sale of confiscated salmon and gear	198.66	1,043.73
From the Master Fish Warden, fee and mileage in case of Ed Lesina vs. Oswald Richter ..		41.10
Total for District No. 2		\$14,372.69

FINANCIAL STATEMENTS.**DISTRICT No. "1."****HATCHERY FUND**

CR.			
Balance on hand January 1, 1912.....		\$ 3,569.08	
Received from licenses issued.....	\$22,481.00		
Received from fines imposed.....	745.47		
Received from the sale of confiscated salmon and gear.....	1,840.82		
Received from the sale of unused property.....	55.00	25,122.29	\$28,691.37
DR.			
Water bailiffs.....	\$3,258.50		
Launch Astoria.....	1,548.78		
Oregon patrol.....	1,002.25		
Additional patrol service.....	388.86		
Publishing and printing notices closing streams.....	240.55	\$ 6,438.94	
Bonneville Central Hatchery (operating).....	\$ 8,333.95		
Klaskanine River Hatchery (operating).....	3,739.62		
McKenzie River Hatchery (operating).....	1,338.32		
Willamette River Hatchery (operating).....	2,335.81		
Santiam River Hatchery (operating).....	430.03		
Salmon River Hatchery (operating).....	744.42		
Wallowa River Hatchery (operating).....	516.37	17,438.52	
Klaskanine River Hatchery (improvements).....	\$ 2,477.55		
Willamette River Hatchery (improvements).....	1,086.03	3,563.58	
Willamette Falls fishway (improvements).....	\$ 124.48		
Opening mouth of Sandy River (improvements).....	54.35		
Opening mouth of Hood River (improvements).....	49.46	228.29	
Office rent, stenographer hire, etc.....	\$ 570.75		
License books, applications, etc.....	81.46		
Sundries.....	116.30		
Exhibit at fairs.....	166.58	935.09	\$28,691.12
Balance on hand December 31, 1912.....			\$.25

SPECIAL APPROPRIATION.

For the purpose of completing the equipment of the Bonneville Central Hatchery.—Chapter 208, Laws of 1911.

CR.	
Balance of appropriation on hand January 1, 1912.....	\$183.52

DISBURSEMENTS.

Expended for the Bonneville Central Hatchery during 1912.....	\$183.52
Balance on hand December 31, 1912.....	\$.00

SPECIAL APPROPRIATION.

For the purpose of protecting salmon, sturgeon and other anadromous fish.—Chapter 234, Laws of 1909.

CR.	
Balance on hand of appropriation January 1, 1912.....	\$48.43

DISBURSEMENTS.

Expended during the year 1912 for the killing of seals and sea lions at the mouth of the Columbia River.....	\$46.50
Balance on hand December 31, 1912.....	*\$ 1.93

*The above amount has been reverted to the General Fund.

DISTRICT No. "2."

HATCHERY FUND.

CR.

Balance on hand January 1, 1912.....			\$ 6,189.49
Received from licenses issued.....	\$13,287.86		
Received from fines imposed.....	845.07		
Received from sale of confiscated salmon and gear.....	198.66		
Received from the Master Fish Warden, fee and mileage in case of Ed. Lesina vs. Oswald Richeter.....	41.10	14,372.69	\$20,562

DR.

Water bailiffs.....	\$3,485.76		
Additional patrol service.....	674.45		
Publishing and printing notices closing streams.....	58.75	\$4,218.96	
Tillamook Hatchery.....	\$1,067.93		
Yaquina Hatchery.....	1,148.86		
Alsea River Hatchery.....	555.89		
Siuslaw River Hatchery.....	788.65		
Umpqua River Hatchery.....	1,485.15		
South Coos River Hatchery.....	1,352.49		
Coquille River Hatchery.....	225.72		
Rogue River Hatchery Station.....	522.65	7,147.34	
Seining and rescuing fry in Ten Mile Lake.....	\$ 157.50	157.50	
Ament fishway (repairs).....	\$ 28.12		
Plans and specifications for proposed fishway at Gold Ray Dam, Rogue River.....	103.40	131.52	
Office rent, clerical assistance, etc.....	\$1,466.77		
License books, blank forms, etc.....	50.02		
Typewriter, scales, etc.....	156.66	1,673.45	
Salaries and expenses of State Board of Fish and Game Com- missioners.....	\$ 549.88	549.88	13,878.65
Balance on hand December 31, 1912.....			\$ 6 683.53

SPECIAL APPROPRIATION.

For purchasing necessary lands for salmon hatchery sites, for building, equipping, operating and maintaining salmon fish hatcheries on coast streams of the State of Oregon south of the Columbia River.—Chapter 209, Laws of 1911.

CR.

Balance of appropriation on hand January 1, 1912.....	\$7,919.02
---	------------

DISBURSEMENTS.

Tillamook Hatchery.....	\$1,537.18		
Yaquina Hatchery.....	1,203.27		
Alsea River Hatchery.....	1,010.30		
Siuslaw River Hatchery.....	982.11		
Umpqua River Hatchery.....	1,258.53		
South Coos River Hatchery.....	1,319.56		
Coquille River Hatchery.....	608.07	\$7,919.02	
Balance on hand Decemher 31, 1912.....			\$.00

SPECIAL APPROPRIATION.

For the payment of the salary and expenses of the Deputy Fish Warden for Fishing District No. "2."
—Chapter 88, Laws of 1911.

CR.

Balance of appropriation on hand January 1, 1912.....	\$1,325.50
---	------------

DISBURSEMENTS.

Salary for a portion of the year 1912.....	\$900.00		
Expenses for a portion of the year 1912.....	425.50	\$1,325.50	

SPECIAL APPROPRIATION.

For the payment of the salary and expenses of the Master Fish Warden and the salary and expenses of the Deputy Fish Warden.—Chapter 88, Laws of 1911.

CR.

Balance of appropriation on hand January 1, 1912..... \$5,577.68

DISBURSEMENTS.

Salary of the Master Fish Warden for 1912.....	\$2,500.00	
Traveling expenses of the Master Fish Warden for 1912.....	\$712.35	
Office expenses of the Master Fish Warden for 1912.....	943.73	1,656.08
Portion of salary of Deputy Fish Warden during the year 1912.....	880.65	
Expenses of Deputy Fish Warden for 1912.....	540.95	5,577.68
Balance on hand December 31, 1912.....		\$.00

SPECIAL APPROPRIATION.

For the payment of the salary of the clerk for the State Fish Warden's office.—Chapter 88, Laws of 1911.

CR.

Balance on hand of appropriation January 1, 1912..... \$1,514 52

DISBURSEMENTS.

Salary of clerk during the year 1912.....	\$1,500.00
Balance on hand December 31, 1912.....	\$ 14.52*

*The above amount reverts back to the General Fund.

RECAPITULATIONS OF RECEIPTS AND EXPENDITURES.

Amount on hand in Hatchery Fund for District No. 1, January 1, 1912.....	\$ 3,569.08	
Receipts for the year 1912.....	25,122 29	\$28,691.37
Balance on hand January 1, 1912, of appropriation for completing the equipment of the Bonneville Central Hatchery.....		183.52
Balance on hand January 1, 1912, of appropriation for protecting salmon, sturgeon and other anadromous fish.....		48 43
Balance on hand in Hatchery Fund for District No. 2, January 1, 1912.....	\$ 6,189.49	
Receipts for the year 1912.....	14,372 69	20,562.18
Balance on hand January 1, 1912, of appropriation for purchasing necessary lands, building, equipping, operating and maintaining coast stream hatcheries.....		7,919.02
Balance on hand January 1, 1912, of appropriation for the salary and expenses of the Deputy Fish Warden for Fishing District No. 2.....		1,325.50
Balance on hand January 1, 1912, of appropriation for the salary and expenses of the Master Fish Warden and the Deputy Warden.....		5,577.68
Balance on hand January 1, 1912, of appropriation for the salary of the clerk in the State Fish Warden's office.....	1,514.52	\$65,822.22
DISBURSEMENTS.		
Against the Hatchery Fund for District No. 1.....	\$28,691.12	
Against the appropriation for completing the equipment of the Bonneville Central Hatchery.....	183.52	
Against the appropriation for protecting salmon, sturgeon and other anadromous fish.....	46.50	
Against the Hatchery Fund for District No. 2.....	13,878.65	
Against the appropriation for purchasing necessary lands, building, equipping, operating and maintaining coast stream hatcheries.....	7,919.02	
Against the appropriation for the salary and expenses of the Deputy Fish Warden for Fishing District No. 2.....	1,325.50	
Against the appropriation for the salary and expenses of the Master Fish Warden and the Deputy Warden.....	5,577.68	
Against the appropriation for the salary of the clerk in the State Fish Warden's office.....	1,500.00	59,121.99
Balance on hand December 31, 1912.....		\$ 6,700.23

